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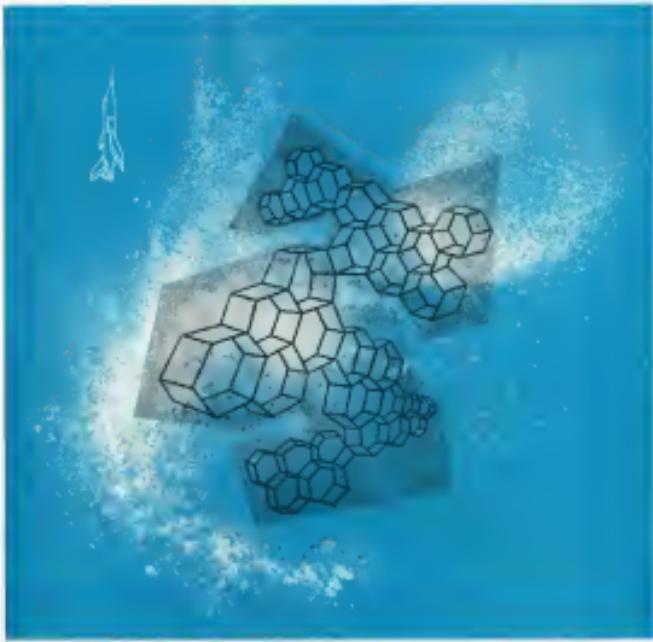
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AVIATION CALENDAR

- Mar - 4th Annual American Society of Mechanical Engineers Gas Turbine Conference and Exposition, Sheraton Hotel, Washington, D.C.

Mar - 5th The Long History of Space Time by Dr. W. A. Wiles, The Franklin Institute, Philadelphia.

Mar - 4th-5th Annual Air Line Photo Show, An Safety Forum, Hotel Sherwood, Chicago.

Mar - 5th-8th Annual Shock Tube Symposium, Palo Alto, Calif. By Action Research Corporation, Fairchild Special Weapons Center, Kirtland AFB, N.M.

Mar - 8th-9th SWIRL, St. Paul.

Mar 18 International of the Aerospace Sciences, National Flight Propulsion Meeting (Joint clearance) responded 1000 attendees.

Mar 18-19-20th Annual Heat Transfer Technical Conference, Oklahoma State University, Stillwater, Okla.

Mar 18-21st Annual Conference on Aviation Electronics, Hotel Villars, Brussels, Belgium.

Mar 18-20th Annual Meeting, Conference, American Society of Mechanical Engineers, Station Bldg, Hotel Dakota, Tex.

Mar 17-21st Annual Colloquium, Conference, and Exposition, The American Rocket Group for Astronautical Research and Development, NASA, Pasadena, Calif.

Mar 17-21st 1978 Nuclear Congress, 23 W 41 St., New York City.

Mar 17-21st-19th Annual Conference No. 1, American Society of Civil Engineers, Convention Center, Philadelphia, Calif.

Mar 17-22nd International Astronautical Federation, 11th Congress, Los Angeles Calif. For details write International Astronautical Federation, 6-10 rue de l'Amiral Charcot, Paris, France.

Mar - 20th-22nd Conference on extremely high temperatures on earth, Göttingen, Germany.

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2010	\$5.0B	\$0.8B	\$1.60
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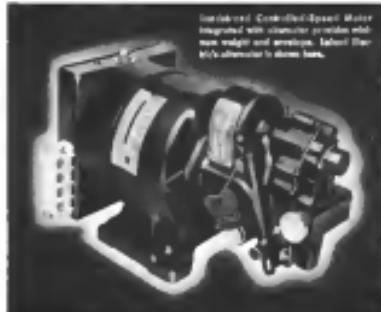
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AVIATION CALENDAR

(Continued from page 5)

Temperature: June 10-10/26) sponsored by U.S.A.F. Cambridge Research Center, L.G. Cook Auditorium, Wright-Patterson Air Force Base, Ohio. For further information contact: Miss. 10-19-24, Four Inter-Services and Industry Symposium on Guided Missile Training Equipment, intended to disseminate better knowledge: West Ordnance Laboratory, White Oak, Silver Spring, Md. Program: June 16-17; Mr. J. G. Voth, Head of New Missiles & Systems Division, U.S. Naval Ordnance Test Center, Port Hueneme, Calif. May 24-26—Annual Meeting, Assoc. Visual Arts, Statler Hotel, Washington, D.C. May 24-27—Institute of Radio Engineers' National Convention, Waldorf-Astoria Hotel, and New York Coliseum, New York City. May 27-28—Int'l. R.J.C.-R.N.A.S. Seminar (World War II, Toronto, Canada. Contact C. B. Stevens, Chairman, 149 South Drive, Toronto 5. May 27-28—Int'l. American Management Assn., Management Methods for Product Development Seminar, Sherman-Astor Hotel, New York City. April 8-10—Mobile International Symposium, Electronic Components Engineering, So Caltech Bldg, 39 W. 10 St., New York City. April 10-12—International Training Society Annual Meeting, Statler Hotel, Washington, D.C. April 18-19—Smiths Institute of Radio Engineers Conference and Electronics Show, St. Andrews Hall and Municipal Auditorium, San Antonio, Tex. April 18-19—Telecom Testing Requirements and Controls, Used in Aircraft and Space Systems, M.I.T. Telecommunications Soc., M.I.T. Telcom Club, Engineers Club, Philadelphia, Pa. April 18-19—14th Annual National Press Services Broadcast Seminar, Sheraton Hotel, 375 Madison Ave., New York, N.Y. April 19-21—Institute of Electrical and Electronics Engineers' Second Annual Technical Meeting, New York Hotel, New York City. April 23-24—1970 Electronic Components Conference, Ambassador Hotel, Los Angeles, Calif. April 26-27—Second Annual Aerospace Conference, presented by Air Force Office of Scientific Research and Institute of Aerospace Sciences, Shady Shores Hotel, Dallas, Texas. May 4-7—Fourth National Flight Test Instrumentation Symposium, Park Sherman Hotel, Seattle, Wash. May 12-14—National Conference on Avionics Electronics, sponsored by Institute of Radio Engineers, Edgewater Hotel, Denver, Colo. May 14-16—Spring Meeting, Society for Experimental Stress Analysis, Hotel Monaco, Cincinnati, Ohio. May 19-20—14th Annual National Conference, Society of Advanced Weight Engineers, Edgewater Hotel, New York City. June 2-4—1970 National Telecommunications Congress, Lord Baltimore Hotel, Baltimore, Md.—Mobile International Administration Symposium and Congress, Colorado, N.Y. N.Y.

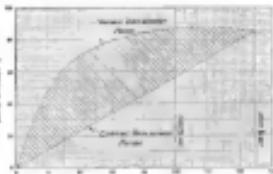
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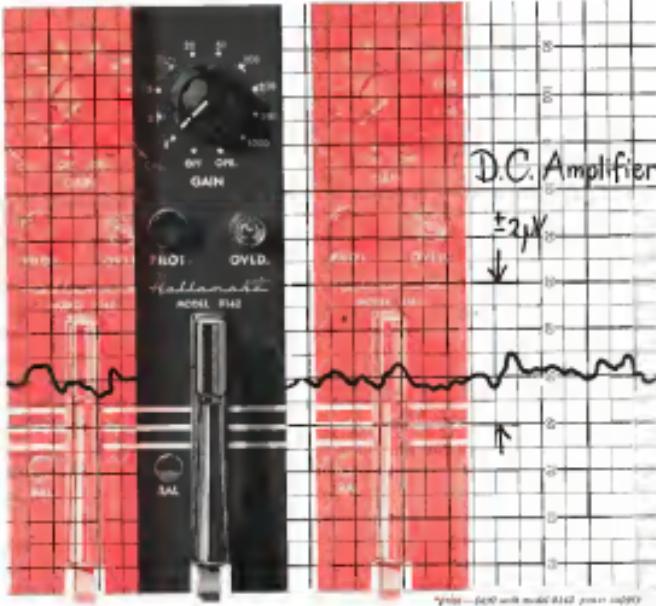
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* 960/960: Transmitter can operate 6 mts higher than receiver in RCS position and on same frequency as RCS selected position

RECEIVER:

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FLY WEATHER-WISE

These weather items prepared in consultation with the United States Weather Bureau



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AIR MASSES

Diagram above shows the major air masses moving into the United States. Broadly speaking, they fall into two categories: Polar and Tropical. Each has certain weather characteristics associated with it.

Polar Air Masses generally move over extremely warm surfaces and become unstable, so their weather is characteristically showery. Depending on amount of

measure unconnected, they form cumulus-type clouds, rain or snow showers and often bring stiff low-level winds.

Tropical Air Masses moving from warm source regions are cooled from below and become subsided. Stratified clouds like Stratus or Fog are formed. When this mass meets colder Polar Air, it will roll up over cold front, producing showers and thunderstorms.

FORECAST

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Figure 4.8 is derived by adding the results of Figures 4.7 and 4.6.



Win-Free Miles Around With Miles

EDITORIAL

Technical Rivalry Is Healthy

successful development and corresponding penalties for failure

The most recent example of what healthy technical rivalry can do is, of course, the success of the Army's Explorer satellite in contrast to the technical problems still besetting the Navy's Vanguard project. The decision to bar the Army from this technical competition several years ago was just as soundly based as the current decision to develop only a single missile defense system. The technical divide between the Army and USAF in developing an otherwise single Silencer missile again stimulated further progress toward operationally useful levels than if a single service had been able to develop along on its project, which is the knowledge that it had no competitors other than the Soviet Union.

Propulsion Examples

The propulsion field has been shaded with examples where inter-service rivalry served the country from major military advantage. In the era just before World War II, the Army Air Corps became fascinated with the streamlining possibility offered by liquid cooled engines and made a policy decision to abandon all air-cooled engine development. The Navy took a different view and peaked the air-cooled engine strength so that when the man of World War II arrived the Army would have been in real trouble without the Navy sponsored air-cooled engines to power so many of its fighters and bombers. Similarly, in post-war propagation battles the Air Force has taken a consistently dim developmental view of the turboprop while the Navy has been equally consistent in its support of this type powerplant as an admirable "workhorse of the jet age." The fact that both Air Force and conventional transports are flying on extremely useful turboprop engines today is a concrete result of the Navy's technical policy and a dividend of otherwise technical results.

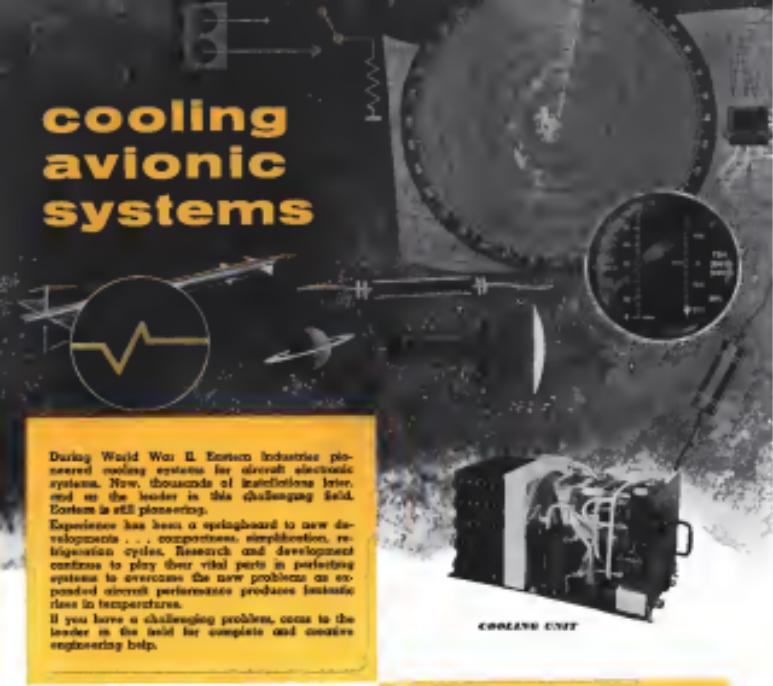
One Person

The only genuine dagger resulting from inter-service territorial rivalry is that publicly pronouncing developments tend to be pushed long past the point when any measure of payoff in useful weapons has passed, mainly for the purposes of military politics. Also, if that territorial rivalry is increased past the development phase into production of two essentially duplicating weapons systems, such as the ERBM's. Then, and later, it becomes a luxury the taxpayer can neither afford nor easily dispense.

In the great debate on defense reorganization let's be careful to distinguish between political and technical inter-service rivalry and valid inquiries that would eliminate or stifle the strongest type of competition on the technical development level. Without healthy technical competition between both industry and the military services, we cannot make progress at the rate demanded to stay ahead of our international competitors.

—Robert Moltz

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During World War II, Eastern Industries pioneered cooling systems for aircraft electronic systems. Now, thousands of installations later, and as the leader in this challenging field, Eastern is still pioneering.

Experience has been a springboard to new developments... compactness, simplification, refrigeration cycles. Research and development continue to play their vital parts in perfecting systems to overcome the new problems as expanded aircraft performance produces extreme rises in temperatures.

If you have a challenging problem, come to the leaders in the field for complete and creative engineering help.



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Custom-made units, with or without refrigeration cycles, provide a method of maintaining safe operating temperature limits in electronic equipment. Standard sub-assemblies and components normally are used to create a custom-made design to fit your exact needs. Costs are minimized for these completely self-contained units by combining heat exchangers, fans or blowers, liquid pumps, reservoirs, flow switch, thermometer, and other common components.

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Carlo E. Borges, president of American Machine & Foundry Co.

George C. Morris, vice president and general manager of the Santa Division, Boeing Airplane Co.

Col. Frank M. Faxon, USAF, commanding officer of the Research and Development Center, Wright-Lewis Organization, Wright-Patterson AFB, Ohio.

S. R. Tremble, director of advanced research, Grumman Aerospace Corp.

Richard D. Brooks, vice president and general manager of Lockheed Subdivision has been elected president of the Lockheed Missiles and Space Co.

George W. Beale, vice president and general manager, Goss Hydraulics Engineering Inc., North Hollywood, Calif., retired from Goss Hydraulics Inc., Jerome, N.Y.

James L. Doolay, vice president-administration, McClellan Motor Corp., Los Angeles.

I. A. Modell, president of Avco Acoustics Services Ltd., subsidiary to Eusope d'A. Avia

INDUSTRY OBSERVER

► **Convair** is proposing a Mach 6 ramjet weapon system that would weigh 12,000 lb., be carried approximately 1,000 mi. toward a target by the B-52, be released to travel up to 3,000 mi. to target. Attack could then return 4,000 mi. to its home base. Total weight would carry approximately 1,000 lb. payload. By above 120,000 ft. Convair has "Words That Win" engineers the program.

► **North American** WS-110A chemical booster is scheduled to fly for the first time in 1962, because operational in 1963. Flight test program will be highly accelerated to meet the operational test date. Indication is no purchase. An F-104 has placed on WS-110A test site so that competition division was delayed only eight days after the date originally set despite the exceedingly difficult clever between the designs of North American and Boeing and the equipment and present uncertainties which required re-evaluation.

► Nuclear warhead version of Hughes Falcon antiboar missile is scheduled to be flight tested in the next few weeks.

► **Fairchild** short ballistic missile is a two-stage solid propellant missile, with optimum specifications calling for an overall diameter of 34 in., length of 26 ft. and 25,000 lb. gross weight.

► **Vestrel**'s experimental lifting concomerplane Model 76 has flown vertically and horizontally but has not yet made a transition flight. Test program has been delayed somewhat while components used in the two dualized tail fins are being checked for pitch and yaw control as vertical flight are strengthened. First transition flights are expected to be made this month.

► **Turbjet** manufacturers have development plans for engines to 40 supersonic transports which might be flying by 1970 with speeds in the 1,000 to 1,500 mph range. So far, version of General Electric's X-227 engine for WS-110A chemical booster probably will be generated to fit this role.

► **Vertol** 107, a company tandem-turbine helicopter, is scheduled to roll out next month. Powered by two Lycoming T55 turboshaft engines, the project replaces the tandem rotor configuration of earlier Vertol models. It has a smaller fuselage but a rotor size also than the H-21.

► **Rome-Windham Corp.** is providing electronic countermeasures equipment used in two Air Force electronic countermeasures aircraft—McDonnell Aircraft's Gauze Quid (GAN-72) designed to detect attacking interceptor and missile away from our borders, and Finsliff-Aerospace Bell Gauze (GM-71) designed for surface launch, possibly against attacking bombers.

► **Goodrich Aircraft Corp.** is working on means of making its ATRAN-Antisubmarine Target Range and Navigation System—follow a ship with the same accuracy as a human pilot to direct a crew module to cause targets. Eventually, ATRAN requires an electronic "map" such as a tape of the "seeding" of the terrain to be overfown which did previously have resulted from a radar set carried by reconnaissance aircraft. In operation, ATRAN continuously compares recorded map with terrain and automatically corrects for any deviations from desired track.

► **Republic Aviation**'s new helicopter division is actively disseminating its French-built Sud-Alouette 2 jet-powered helicopter to prospective civilian customers. One aircraft is in the northeast, the other in the west. Republic is busy looking additional Alouette demonstrator pilots, including some without previous rotary-wing experience, to expand its demonstration program. Current schedule calls for Republic to move another five to 10 Alouettes via air shipment by the end of the month.

► **Fairchild** Aviation exports a British European Airways contract that requires at least two of its Rotoliner VTOL transports. Production model Rotoliner is scheduled to fly later this year.



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Washington Roundup —

Presidential Optimism

Increased defense spending will aid President Eisenhower's war on cost of living, government programs and policies that will bring record of the U. S. economy later this year.

Eisenhower spoke of "a sharp increase in the first half of this year in the rate at which defense procurement contracts will be placed with private industry." He made no mention of the sharp cutback in the rate at which procurement contracts were placed in the last half of 1957 under Administration spending ceilings.

The expression of both cause and effect in Congress and Labor sometimes mentioned that unemployment would be 4,694,000 in mid-January—the highest since 1936. Aircraft industry employment has dropped more than 100,000 from a peak of 915,000 last April.

Eisenhower also cited as one of the country's "strong and undiminished underlying bases of growth" the "dilution of inflation being spent every year on research and development that will create new products and new jobs."

Offer to French

France's offer to demonstrate the bilateral agreement with the U. S. has been followed last week by a State Department offer giving Air Force a route from Paris to the West Coast without asking for additional traffic rights for U. S. carriers in return. The note added that France relinquishes her traffic rights to Brussels in exchange for the West Coast route—a cleaned step down from an earlier U. S. stand that stipulated a number of new traffic rights for U. S. airlines.

Possibly that France will accept the latest offer as an interim solution to the problem since it appears strong from observers' aspect that France is not too eager to complete revoking of the bilateral agreement for fear of being forced into bringing a number of planes French carriers into an unusual route pattern. An agreement calling for full reciprocity of routes and capacity of air passenger traffic in France claims it a wise world welfare device to let France claim it a wise world welfare device given to Air France if other French carriers were included.

Capital Gains

Defined, is double for purpose of levying legitimate taxation on individuals to set aside earnings from capital gains tax for the purchase of new equipment when it comes to the individual who sells it. There will be opposition, however, led by Sen. John Williams (R-Bed.) and Sen. Frank Lausche (D-Ohio). The measure already has passed the House.

Atomic Committee

Joint Congressional Atomic Energy Committee plan to return science to outer space medium despite the opposition of a special Senate subcommittee on energy (see page 20). Nuclear propulsion is the most important aspect of the outer space field of the future," Rep. Carl Durham (D-N.C.) chairman of the Atomic Committee, declared. "It is generally agreed that nuclear propulsion will be acquired to get to outer space, and getting there is the most important part of this field." Durham reported that progress on all three of Atomic Energy Commission's nuclear power projects aimed at outer space is encouraging. Rover nuclear nuclear

project, Pluto nuclear energy project, and SNAP (Strategic Nuclear Auxiliary Power) project. Durham has no desire to ditch the outer space program that was appointed principally after the launching of Sputnik. But the two subcommittees which probably will be most active on outer space proposals for the Branch and the Defense and Subcommittee headed by Rep. Mel Price (D-Ill.) and the Military Appropriations Subcommittee headed by Sen. Henry Jackson (D-Wash.).

Space Lawyers

Rep. Kenneth B. Keating (R-N.Y.) says legislation is under way to prevent in many serious and complex problems in law as to scientists and engineers and their growing challenges to the legal profession are not off.

Keating said that, while his main reflect great expense and while legal solutions cannot naturally provide practical results, the space age presents a difficult picture. Lawyers, he said, will have to anticipate and confront sporadic problems before they become additional elements of social drama. "If we wait until the collisions occur before we devise the rules of the road, then there may be no hope for the settlement of the disputes by a rule of law."

Keating raises these questions as examples:

- "Are international rules of discovery and occupation suitable for determining the rights of nations to territorial bodies on which landings may be made?"
- Who owns speed? Suppose we wish to attempt to apply the principles of established international law by extending the boundaries of each nation into outer space. Because of the curved shape of the Earth, the extension would give us an irregular zone which would grow bigger and bigger in relation to the amount as it reached further into space. At some point these areas would overlap and more than one state would be occupying the same area. Moreover, the continuous movement of the Earth on its own means that the relationship of particular areas on the surface of the Earth to space beyond the atmosphere would be constantly changing.
- "What would be the handing nation's liability for damage if friends, if we were to come crashing down and damage valuable property?"

French, Dutch Missile Tour

Group of French and Dutch governmental-industry representatives have just completed month-long tour of U.S. missile installations and bases to familiarize them with weapons in or nearing operational status. In an defense measure, French appear to favor missiles with solid-fueled propellants, like Boeing Bumper, which over believe are less vulnerable to massive atmospheric than ground-launched missiles like the Nike and Talos.

Small Business

Senate Small Business Committee has year plans to focus on three areas as they affect small firms—designing the weapon system, the missile program, policies on government-owned production equipment, procedures of Civil Aeromotive Board and other regulation agencies, programs for a pooling of small business facilities on government contracts. The group is headed by Sen. John Spelman (D-Ala.).

Industry Girds for Tough Contract Talks

Sikorsky strike vote may portend rugged negotiations; labor, management seem in stubborn mood.

Strike vote and last-ditch negotiations have set off at Sikorsky Division of United Aircraft Corp. what is being a belligerent and trouble-prone spring for you the aircraft industry and its labor unions.

Management, with cutbacks, stretch-out and layoff costs, face last year appear to be on the road for easy come, promise. Unions, on the other hand, are not responding with any sensible reaction to the same circumstances.

If anything, the unions may be reaching a little further than usual. Significant signs are everywhere, at least in some areas, by the United Auto Workers and the International Association of Machinists, which had not usually seen in the aircraft industry at national conventions last year. What may be is the way it is pushed by the unions for industry-wide bargaining.

Some unions expect a bitter spring. Others think the negotiations will progress smoothly and fairly but little real action. The Sikorsky situation thus becomes a good barometer on how far bargaining and unionism are prepared to go or not to go.

Strike Vote

At Sikorsky, the UAW voted to strike at midnight last Saturday unless a settlement was reached at two meetings prior to the strike deadline. Final strike vote needed only a bare majority for ratification, compared with the two-thirds vote needed for initial strike or termination.

Observers on the Sikorsky scene say the same drive does not appear to be

Plato Components Test

Washington—Initial tests of separated "key components" of the Plato soft missile system were unsuccess- ful last week by Army Avco who issued Plato subcontractors.

Plato was identified by Aviation Week last Dec. 6 (p. 26) as an Avco-Sylvania Electronic Products Inc. project aimed at a relatively mobile intermediate-range ballistic missile defense system for overseas U.S. bases.

Work is centered in Sylvania's Missile Systems Laboratory of the Electronic Systems Division at Watertown, Mass. Technical supervisor is Robert A. Mazzoni and contract supervisor a Boston Ordnance District Subcontractor, Avco General Electric Co., Aerospace Machines and Facilities Co. and Sanders Associates Inc.

Flight system schedules to be finalized in the patsys are, well, we're

far from clear. Last week also identified Sylvania as another subcontractor to Radars Corp. of America for the ballistic missile early warning system (AW Jan. 27, p. 28), and the Radars Corp. Division of Avco Research and Development Command will manage the overall program. The early warning system will use the Defense Early Warning line and other existing communications and will operate in conjunction with SAGE.

Univac Corp., San Diego, Calif.; Convair at North American, Los Angeles; Chase Wright, Inc., Falls Church, Va.; and Control Components, Inc., March 15. In all cases, it looks as if union and management are preparing for a long hard gauntlet at the bargaining tables with neither side showing much inclination for concession.

Coupling inflation a general across the board wage hike ranging from a maximum of nine cents per hour to a top of 14 cents per hour, for a top hourly wage rate of \$13.31 for grade 1 empl. The wage rate was to be effective in December, not at contract expiration.

Union Demands

Union demands at Sikorsky follow what is generally believed to be a national pattern, reflecting congressional pressure, a union shop and broadening of the grievance process, plus a variety of other demands.

In addition to SAMAR, joint plant stewards, the IAM last December settled with Pratt & Whitney Aircraft Division of United Aircraft Corp. on some terms offered to Stiles Div. Excepton was PAAW's North Haven plant. Contract there is held by UAW and expires in April.

AVATION Week survey of industry's labor drive shows, in general, that the six large unions have apparently moved from a stance emphasis on an up-or-down, wide base, dealing with larger companies first. They are:

- North American Aviation, Inc., Los Angeles, Calif.
- Lockheed Aircraft Corp., Burbank, Calif.
- Chase Wright Aircraft, Inc., Dallas, Tex.
- Convair Division of General Dy-

namics Corp., San Diego, Calif.

Convair at North American, Lockheed and Chase Wright have been classified as complete by the IAM. March and Convair contract ends April 15. In all cases, it looks as if union and management are preparing for a long hard gauntlet at the bargaining tables with neither side showing much inclination for concession.

Besseys points emerge next week on the following:

- Stellar seniority pay and relatives first clauses, apparently as a result of heavy layoffs in the industry.
- Adoption of escalator clauses tied to cost of living index, with contract 13 cent upward adjustment added to a wage on the present hourly rate (since maximum must fit in with current level).
- Cost of living increases from the present 10 cent to 12 cent.
- Considerable expansion of shop grievance programs.

On the other hand, management tends to prepare for a strenuous bargaining fight, threat union contract outbreaks and escalation and blotting out of strike credit by enacting new replacement rules.

The spokesman contend present economic situation nationally and within industry "leaves little room for labor concessions."

Points for Negotiations

Escalator clause and the like in hourly wage rates probably will take precedence in upcoming negotiations. IAM already has escalator clause at Lockheed and Convair San Diego plants, and UAW previously gained this at North American.

Thinking right now is the corporation will strongly resist adding 13 cent cost of living adjustment to its wage hike. Unions contend part of the adjustment will go into the base rate, but the lag question is a live one.

Dip in the cost of employment has the two unions taking hard line on compensation of increasing and cost of relocating employee, a clause which includes a per diem adjustment. Union worth point of household shipping costs, car, phone expenses including eight cents a mile for up to two cars, and relocation pay (\$11 a day for worker and spouse, and \$5 a day for each minor dependent) up to 31 days.

All employee choices for home down his relocation management, union wants payment of full insurance price of one-half day's pay for every month of absence.

For the 35 hr. week probably will come up for discussion but that conclusion are unions will not push it hard. Profit sharing, proposed at UAW contract,

convention is not expected to be a big issue.

Industrial operations programs will get a head start over. UAW is preparing a plan of site wide decentralization within the industry. Plus orders on completion between ages of 16 and 27 and calls for site-wide training plan plus four hours a week of those training to be financed by the company.

A first year supervisor will get 65% of the journeyman rate, rising to 92% in his fourth year on the basis of pay-cut demands. Unions are also proposing job classification procedures, meaning that supervisor, who is disgruntled by returning to his pre-promotion job class, will be given a higher rate. UAW also wants seniority pay for jobs with no graders of emergency work for the contract.

Labor negotiations appear will focus more for union shop but that has been because a steady issue in the past. As of now, Southern California would own prime here's a "maximum of number of days" clause which stipulates that all employees who pass a union meet remain in good standing during the life of the contract.

Both unions also will propose upgrading in sick leave, vacation benefits and pension and incentive plan.

Public Relations Factor

From all indications, both sides have cut on public relations aspects of negotiations, in view of current defense and space developments. One spokesman mentioned "The ghost of the government is at the bargaining table."

While management points to industry setbacks and shortfalls, the unions contend that increased defense tempo with resultant spending will offset the factor.

Unions are known to be preparing public relations program and possibly could. Aviation Week has learned, oil fuel tax assistance by federal authorities and contributions defense public relations to the strike wave have been a best route.

At the UAW's recommendation, delegates approved a \$5 days overtime during March, April and May, with funds collected going into the UAW strike fund (Chase Wright local opposed this move and voted against it, but results were passed by large margins.)

Soviet Astronautical Meeting Planned

Moscow—Soviet senior officials expect their 1236 scientists from at least 10 nations to attend the International Astronautical Congress scheduled to be held here in August. Last year's meeting of the International Astronautical Congress was held in Brussels (AW Oct. 18, p. 29).

Defense Warned Missile Tests Jeopardized by Telemetry Lack

By Philip J. Klass

Washington—Defense Department has been warned that success of missile and aircraft flight tests is being jeopardized by lack of communication and tracking in modernizing technology equipment used facilities, Goddard says.

Goddard says that each group starts for the other to set procedures to insure the switch is smooth. This, Goddard says, is why the telemetry equipment has not been so far as he believes, and for more extensive use in case of failure, equipment which the equipment which belongs to others could produce.

Military has been urged to establish uniform organization known as the Inter Range Instrumentation Group which seeks to standardize telemetry facilities among the various test ranges.

Assigned releases, based at 105 to 235 sec, has been arranged as underground, yet left if it is being taken over for use on other military applications. Even with the original spectrum assignment, exchanges are so such the sound that much telemetry equipment has been developed and poor performance, Goddard says. In particular, Goddard says, is the problem of being checked out, a task which has been a major headache for the Army. For checking the output of telemetry transmitters, Sig Int has been developed and is being tested to avoid errors. This not only speeds completion and delivery of the task of satellite check-out but fails to provide complete coverage that equipment is operable.

Transfers, based on the 2,000 mc region she has been assigned for telemetry. However, at these increased frequencies, new techniques must be employed which increase size, weight and cost of airborne equipment.

Another function of the Defense Department group which the National Technical Conference proposes would be to share information among agencies, mostly in Inter Range Instrumentation Group, to facilitate cooperation. Springs, who is director of the Defense Department's Defense Communications Agency, although he admits the situation is less than ideal, thinks the problem can be fixed. Avco Electronics Inc., under Avco Signal Corps contract has been studying the whole telemetry problem for the past year. Following completion of the study, during the coming year the integrated RDB telemetry standards can be revised to provide for new pulse modulation techniques standard.

Although Springs considers the importance of telemetry, he says Defense is not in a position to establish the agency which the National Technical Conference chairman have suggested

Senate, House Form Space Units; USAF Space Claim Recognized

By Fred Hartman

Washington—Both the House and Senate moved in separate actions last week to create new organizations to shape national space policy and institute U.S. activity in space exploration.

Earlier, Defense Secretary Neil H. McElroy endorsed establishment of the Advanced Research Projects Agency and tentatively placed responsibility for operations of advanced space vehicles with the Air Force. These were the developments:

- Vice President Richard Nixon, acting on recommendations of Senate Majority Leader Lyndon Johnson (D-Tex.) and Missouri Senator William Knowland (R-Calif.), named a 15-man special committee to study space problems and to recommend a national space policy.
- Rep. Kenneth B. Rungtun (R-N.Y.) introduced a resolution to create a standing House committee to deal with space problems on a permanent basis.
- Senator McElroy issued a directive creating the Advanced Research Projects Agency and named Ray W. Johnson, General Electric Co vice president, as its director.

ARPA's Functions

ARPA's function will be to promote basic research and development of weapon systems and military requirements for an indefinite period, and space projects authorized by the President for one year. By that time it is expected that Congress will have studied and acted on legislation to place firm responsibility for space programs in either an existing or a new agency.

Named to the special committee established for this purpose were Democratic Senators Johnson, Richard Russell (Ga.), Wayne Morse (Oregon), Wayne Morse (Ore.), Everett Dirksen (Ill.), Theodore Francis Green (R.I.), John L. McClellan (Ark.) and Clinton P. Anderson (N.M.). Republicans on the Senate include Spiro Agnew (Md.), Alexander Wiley (Wyo.), Leibowitz (N.J.), George H. Mahon (Miss.), John Brundin (Okla.), Roscoe Holopak (Iowa) and Karl E. Mundt (S.D.).

Formation of a staff and an operating plan for a planned series of actions are expected to begin this week.

Rungtun, in introducing his resolution to create a standing House Committee on Outer Space, pointed out that to date action had to be confined and piecemeal, "and that is not good."

He said he introduced a bill to establish a joint congressional committee as the first day of the session, but that

no action had been taken on the proposal. Meanwhile, the Senate was about on its own.

Kingston proposed amending the Rules of the House to create the committee and authorize it to make continuing studies of the use and control of outer space with particular attention to:

- Research, development, production and other activities of any department or agency of the government, or of any private entity, conducting activities relating to outer space, including negotiations relating to satellite and Earth satellites.
- International policies and agreements concerning legal, jurisdictional, communications, navigation and other matters concerning the use and control of outer space.
- Space standards and safeguards with respect to outer space activities.
- Control and dissemination of information concerning outer space activities.
- Protection of health and promotion of safety in connection with research, development and production activities relating to outer space.

Kingston said the House thus far has given no consideration to a committee dedicated specifically to these matters. In his main statement, he said, a single bill concerned with space cuts across the lines of interest of a number of standing committees. With many bills of such introduction, he added, the result is that a number of committees may want to develop hearings on a single issue or a series of issues.

ARPA and Congress

If approved, the House committee would be able to consider and evaluate the role ARPA will play in the exploitation of space. Congress authorizes the Defense Department to pass out major weapon systems and military objectives in its 1955 supplemental appropriations bill, but placed a one-year limit on nonmilitary space projects.

In reviewing formation of the agency, McElroy said that, at this stage, he did not think that certain projects such as reentry could fit into strictly military or nonmilitary categories. He said the so-called scientific information being moved from present activities is probably more information needed for my further, in-depth planning—strategic, nonmilitary and military.

In referring to projects already under way, McElroy said he felt ARPA should provide direction and financing

but not interfere with the actual operation. This he said would, in effect, make the agency already created in research areas of ARPA, which would do the planning. Other opinion expressed by McElroy:

- There is no reason why the Defense Department cannot work very well with a civilian agency if it is asked to control space projects. "We have done so in the case of the National Advisory Committee for Aeronautics on aircraft development, and very successfully. We have been very happy with what has been achieved by that joint enterprise, and I believe that the NASA has also felt that it has been very satisfactory during the past few years. I would say there would be a complete correspondence on our part with the development of working with an agency like the NASA."

And I think we have contributed to each other's program in a way which I think is most desirable for this kind of thing to proceed."

- William M. Holdren will retain his full responsibilities as director of guided missiles under ARPA, while the new director will assume control of the soft missile, satellite, satellite and other outer space programs.

■ There is no thought of dropping Vanguard project as a result of the two failures in attempts to put a small satellite into orbit.

- Past intercontinental ballistic missile and anti-ballistic missile will be operational by the end of 1959.

Career of ARPA Head At GE Detailed

Washington—Career of Ray W. Johnson, General Electric vice president, who is to direct the Advanced Research Projects Agency has been detailed largely to the fields of advertising and GE's household appliances operations.

After graduating from the University of Michigan in 1927 with a B.A. degree, Johnson joined the advertising firm of Campbell-Ewald. In 1948, he joined the advertising staff of General Electric's Appliance Department, moved up to become manager of the Home Laundry Division, later became manager of the Flooring Products (now bags) division of appliances.

In 1959, when Ralph J. Conder, new president of GE, left General Electric's Appliance Department to become head of Schenck Inc., Johnson followed and joined Schenck's sales department.

In 1942, he followed Conder to the War Production Board where he became director of Technical Bureau. When Conder left WPB in 1944 to return to GE's Appliance Department, Johnson rejoined the firm as vice



RAY W. JOHNSON

president of consumer activities for the company's Television (television) division.

In 1956, Johnson became vice president in charge of affiliated manufacturing companies which included Telechron, General Telephone, Manufacturing and Marketing Divisions.

In December 1956, Conder appointed Charles E. Wilson as president of General Electric where the latter came to Washington to discuss a gas turbine plant during the Korean War. Two months later, the company organized a major reorganization, and Johnson was named executive vice president in charge of appliance and electrical activities.

At that time, GE's consumer division (TV, radio) were just at the same division which developed nuclear and other military equipment. In November 1957, General Electric merged its television business with the defense portion out of Johnson's group and placing it in the Electronic, Aviation and Defense Systems group under another executive.

The four-and-a-half year span, in which Johnson was general manager of all of GE's appliance and electronic division, is the electronics experience cited by Defense Secretary Neil McElroy as one of Johnson's qualifications for his new job.

During this same period, GE's Electronics Division was headed by Dr. William R. G. Baker, who held the title of vice president prior to the reorganization. Baker and his division with a few hundred and five thousand people constitute

Baker, a GE official who has played at the company's electronics re-

search laboratory, said Johnson shares his personal interest in the activities of the laboratory whenever he visits it.

In October, 1955, Johnson received of his command in vice president of the appliance group and formed a "seconded" to his successor. No reason was given for the action, although it may have resulted from GE's liquidating appliance sales.

Johnson, who is 52, has in his office "industrial" holdings of General Electric stock, probably the range of several hundred thousand dollars. Because the ARPA position does not require congressional approval, any conflict of interest would not be a factor.

One of Johnson's first assignments in GE's appliance department saw his experience well qualifies him to handle future group studies. Another former GE associate says he can be tough and meticulous.

Johnson, who is expected to receive \$100,000 or \$150,000 a year in his new post, received a salary of \$150,000 in 1956 from General Electric. Johnson is quoted as saying that he plans to remain at ARPA for not much above two years and then will plan to return to GE afterward.

Nuclear Rocket May Be Accelerated

Washington—Atomic Energy Commission is expected in its Congress on the next future for a substantial increase in funds to accelerate its nuclear rocket program.

Two top AEC spokesman have assured a subcommittee of the Joint Congressional Atomic Energy Committee of the ultimate success in the development of a nuclear propelled rocket.

AFC Chairman Louis Strauss ap-

pealed that there is no skepticism among scientists working on the Reactor Rocket program, and that the program is strong, according to AEC's Dr. John Foster Bissell, testified.

"They are going to do it," Abramson of the hydrogen bomb was a far more difficult undertaking, both Strauss and Abramson pointed out.

The request for new funds will be to finance an alternative approach to Rover, rather than to compete the joint program's timetable. Sen. Clinton Anderson (D-N.M.), chairman of the subcommittee, said Rover is scheduled for initial testing later this year at AEC's Nevada test site.

Depending, after it will be possible to fire it into outer space is one shot, all the thermal problems will have to be solved, along with making sure parts and materials are good enough.

Strauss also gave some optimism for the future, commenting that "there will have to be a very great breakthrough."

'Giant' Engine Gains Cited as Space Need

Washington—Vowing the major steps that must be taken before atomic space flight becomes a reality are giant advances in engine and system reliability and development of own light materials and insulation. A National Advisory Committee for Space Research model rocket and test rocket.

John L. Slingsby, head of the Rocket Engine Branch of NASA's Lewis Flight Propulsion Laboratory, told an Institute of Astronautical Sciences meeting that "it is quite likely that for an audience space flight involving several propellant oxidizers will be used at various steps in the flight."

High-energy liquid propellant rockets show promise for Earth orbit and Moon missions and perhaps as far out as Mars. Slingsby said Nuclear rockets also are promising in these areas.

Proposed atomic engines are probably the best choice, he said, for an intermediate step in reaching the interplanetary flight, Slingsby said.

Slingsby believes a vigorous and more mature research program will put the U.S. ahead in propulsion methods for satellites and space flight. He said these steps must be taken before men fly in space.

- We must develop high-energy fuels and very light weight but powerful engines."

- We must develop propellants so low that they will burn little propellant for long periods of time such as the electric power source.

- We must learn how to make very light structures for space craft, we must along represents a very high investment in structures."

- We must make giant advances in engine and system reliability, for that won't be a space parts warehouse as filling station if we need over parts or lost."

- We must develop very accurate guidance systems in order to fly along the exact orbital path, hopefully with respect to the Moon or planet we wish to reach."

- We must learn to fly safely in the depths of outer space and keep alert in the conditions of ship for many days of flight."
- We must learn how to make vehicles to bring man safely back into Earth's atmosphere and land."



FLIGHT view of Vertol Model 44 helicopter shows Neoprene-coated nylon log which are kept inflated at all times. System costs drug.

Permanently-Inflated Float Gear Tested

AT TAKEOFF, water spray from tilted "logs" that hold main gear floats, and from flying around which turns over a nylon log fits



CRANE hoists Model 44 at sea test.



FUSELAGE on test model has been sealed to a level 22 in sheer state when last trials are compensated to prevent flotation even if punctured.

on Model 44

New York—Permanently-inflated air bags are key parts in one helicopter emergency flotation system developed by the Vertol Aircraft Corp for New York Airways, the Swedish Navy and Selenia Belgian World Airlines.

Announced only a week ago, the system has had 10 hr of flight testing and will undergo U.S. trials next week, according to Vertol officials.

Vertol has combined Model 44 fuselage wings with inflatable gear to allow amphibious helicopter operations under emergency conditions. Company tests were made at Marine Field, Philadelphia Navy Yard.

New York Airways has ordered five Model 44 operating into New York's 11th Street helipad; a platform which extends into the Hudson River. The Swedish Navy has purchased four for amphibious warfare, and Selenia plans to fit two with floats.

Major advantage made from the safety factor is that aircraft's tandem rotor configuration and long fuselage allows the need for a deeper ballast hole according to the company.

Those made by U.S. Rubber Co., are nylon fabric coated with Neoprene rubber. Main gear floats are teardrop-shaped to cut drag. Forward float is



Model 44 water takeoff shown with Neoprene-padded tail section.



Model 44 helicopter touches on main floats in their pivot position at 30 ft.

attached to fuselage. In a get ready which ends as a lancing. Fuselage is sealed to 12 in above waterline, but has been modified to 3 in.

Flight test results to 3 in. low are at present sufficient. Computer logic can well reduce landing speed by two or five knots. Total weight in landing fuselage making at 340 lb. En gines exhaust about 80 lb. of adds final gear such as oil bottles and valves, are used by bypass logic inflated at all times.

All bags are manufactured as aircraft will float even if bags are punctured in the landing. Verid and that for regular operation from a water base, additional hull compartments, barge pumps and other provisions would be required.

Before flight testing, company carried out a series of wind tunnel tests on a model at the University of Detroit.

At Philadelphia, anti-submersible landings were accomplished and water resistance was included with relevant research toward stability margins.

Testing at 30 ft. at freeboard, at a gross weight of 14,000 lb., Model 44 safely landed onto an flat pilot seat, a point selected in much the same as a water landing in a flying boat. Aircraft has been tested at speeds up to eight knots with no difficulty in handling.

Technique calls for pilot to "Be" helicopter into water. At liftoff, water passes from the raised bags that hold main gear, bonds and from motor gear bag.

In first test, Vought lost made HUP-2 amphibian by seeking harborage and adding wings. Rain (AW Feb. 21) 21

1957 caused for extensive modification of aircraft.

Since will use two Model 44s so

expand its helicarrier service on Europe during the British Fair. First flight has been delayed from March for six months due to availability of aircraft.

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Sabre personnel will fly the aircraft. One Model 44 will be equipped with a 15-passenger airline interior, and the other with 14 passenger seats and a lavatory.

Verid will need a pilot, technical representative and crew chief to fly, test to supervisor training and maintenance. The helicarriers are expected to fly about 10 hr. a day.

form, prevents damage to torpedo's housing equipment.

New cone and penetrator system penetrate torpedoes at water entry.

Some failure rates can still occur, fire control is less sophisticated than sonar, which is interacting with acoustic systems to solving the timing disease which leads off stops after proper flight interval.

Precise measures of flight distance is not required since homing equipment receives pulsing the torpedo will surface in certain areas rather than at a specific point.

Mosdo reflects in high subsonic and the system is known to function in the case of initial stellar winds during reentry.

Fluctuations is presented in that the air frame can strike a number of fire points in not heated to use.

Lubertone, Inc., developed fire control system, and function were developed by Pacific Search Naval Shepard Systems took four years from conception to operational status.

Bill to Alter Obligational System Gets Increased House Opposition

Washington — Proposed legislation that would change the present obligational system to one of budgetary accounting and expand authority to borrowing to increase opposition to the House. The bill passed the Senate without objection during the last session.

The proposal increases flight distances and requires more homing equipment receivers placing the torpedo will surface in certain areas rather than at a specific point.

House opposition is high subsonic and the system is known to function in the case of initial stellar winds during reentry.

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pro. file, vendor upon delivery.

Under the bill, H.R. 3002, funds would be appropriated to go for goods or services that are required to be expended during the fiscal year, and place needed authority given to enter into contracts and orders for goods and services to be delivered in future years.

A signed amendment last year, 25 members of the House Appropriations Committee, had the proposed bill would need to confirm the cost and to use more government spending and make it easier to obligate the government.

Intrafield in the House by Rep. C. Robin (D-Fla.), the bill was designed to circumvent large unanticipated increases in labor and improve congressional control of the budget. It is supported by the Caucus Committee for the House Budget, and its passage may argue that the House's reluctance to budget is increasing the use.

At present estimates for appropriations are presented and funds appropriated to enter the goods and services to be ordered in the budget are regardless of whether the goods or services are to be received or paid for in the budget year or during subsequent years.

At the time the services or goods are ordered, an amount is obligated or is

carried in the appropriation account to

the financial statement.

In a question-and-answer session, the chairman said, "We generally debt finance long-range programs for strategic slags and other long-term items Congress and the country know in advance just how big and expensive the program is."

Rep. John Tafel (D-N.Y.) who was one of the originators of the amendment, said



RAT (rocket-assisted torpedo), Navy anti-submarine weapon, as displayed. Torpedo is shown in launching tube (AW Feb. 10, p. 97).

Rocket-Boost Navy Torpedo Operational

By Richard Sweeney

Prototype — Rocket-assisted torpedoes (RAT) anti-submarine weapon system developed by Naval Ordnance Test Station, China Lake, which now is operational with fleet units, was unveiled here last week.

Weapon system consists of light-weight launching torpedo, rocket booster and surface launcher. The control system and analog computer arming data derived from ship's normal weapon gear.

Use of RAT enables surface vessels to wage anti-submarine warfare at a distance and without leaving assigned mission area, instead of having to leave station, close on enemy sub and try to destroy her with depth charges. RAT can be transported on any surface ship having standard 3 in anti-aircraft gun mount. NAVFAC crews put less than half the length,

extra ordnance to endow short-homing missile, solid propellant rocket with boost and maneuvering, to fixed position on deck gun mount. Arming is accomplished by push moment mechanism to simulate real elevation.

System operates for some goes depending on pitch pressure, obtaining stage and bearing information which is fed to the analog computer. Computer programs provide flight and light gears to signal results as ready for launch. Missile is boosted, this to end of target surface as separated from torpedo. Nose cone is separated from torpedo to lower to water by pyrotechnic parachute equipment separates from torpedo on water entry, and torpedo goes on its hunting motion.

Missile weighs 490 lb., is 16 ft long. Torpedo, developed by Chevite Research Corp., is approximately 1 ft long, 16 in. in diameter. Surface crews put less than half the length,

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T2J-1 Trainer Makes First Flight

Five weeks after rollout at North American Aviation's Columbus, Ohio, Division, new B-57B T2J-1 all-weather fighter-bomber made its maiden flight February 20 during a low-level flight with gear down. First flight, nose capsule still mounted, was made three days before. Designed for training pilots from planes through advanced planes, including carrier qualification, T2J-1 is powered

by a single 14,000-lb thrust Westinghouse J46-M-15 turbojet mounted in the belly. Plane incorporates NASA-Columbus-developed nose section criteria permitting nose escape at ground level. Landing gear is suspended at 77 mph, service ceiling is over 40,000 ft. Following initial tests at Columbus, T2J-1 is scheduled to start intensive evaluation program at Edwards, Calif.

the proposed bill will "eternally damage all prospects of a test and break down our hopes of balancing the budget." He added that the bill would destroy the power of the Appropriations Committee to do its job.

Roy D. Marquardt (D-Wash.) another signer of the statement, said last week that under H.R. 5802 any remaining balance of an appropriation at hand at the end of a fiscal year would be gone. This, he said, could impinge a hardship on manufacturers who would submit their estimates of annual delivery rates and costs long in advance. Such estimates, he added, are extremely difficult to determine accurately. Magazines and passage of the bill could result in increased costs of the overall program and a slower delivery rate.

George Hinman, AIA director of industry planning service, disagreed that the bill would interfere with existing vital defense projects and cause costly delays. "He said that if funds are so limited before the end of a fiscal year, no provision as acute as funding constraints for the remaining days of a fiscal year—that could not be corrected by a supplemental appropriation by Congress because of the amount of time it would require."

Production of top priority defense projects such as the antiballistic missile could be seriously affected by the bill, Hinman said. Technological breakthroughs or advances occurring in the program could gain a dubious edge if achieved during a fiscal year which would cause the program to be accelerated or delayed, he said.

"There is no method of determining a year in advance just what our scientists and engineers will discover in their programs of technological frontiers," he said. "If an unexpected breakthrough is made, funds are not available to complete this advance simply because they were not requested in the estimate."

The AIA spokesman said it had been conservative in calling for H.R. 5802 to be denied to the House until it could be measured in a more final year before funds would again flow to contractors. These proposals, he added, could only be brought by adding restrictions to shoulder financial burdens that they might be unable to carry, or to assume risks they are unable to take.

William M. Allen, Boeing Airplane Co. president, also preferred the present legislation in a letter to Magnusen. Allen warned the bill could lead to increased overall costs of programs by requiring a contractor to pace his efforts to the written estimate of expenditures rather than proceed on the most economical total program basis.

In addition, he said, and duly by Congress in appropriating funds for a new test would result in invoices not being paid.

Bell HU-1A Helicopter Ordered in Production

Pt. West—Army's new HU-1A transport and medical helicopter has been ordered. An HU-1B prototype was under construction at the Bell Helicopter Corp. plant here under a contract issued by USAF's Air Materiel Command.

Guides for the HU-1A, production version of the XH-80, include production tooling, spare parts and supporting equipment. Bell has the enough HU-1A orders in many production through the end of 1970.

The order from AMC, which encompasses the contract for the Army, follows a series of three orders for 15 test versions of the utility helicopter. First order was for their experimental model. These three XH-80s now in Phase III flight test.

AMC ordered six YHU-1As for second test, and the first serial aircraft under the production New Item code as "Last version." Nine more HU-1As were ordered for field service test. With the new order, Bell will tool for quantity production.

Bell's new utility machine is powered

by an 825 shp Lycoming T53 turboshaft engine. It has a top speed of about

195 mph, range of three plus 300 mi

with full payload and a vertical rate of climb of 3,000 fpm.

Army Orders French Anti-Tank Missile

Paris—Nord Aviation has received a "tentative" order from the U.S. Army for an S510 anti-tank wire-guided missile.

The S510, and with considerable success by the Israeli army against Egyptian tanks during the Six Day war, weighs about 74 lb.

It can be launched from a pop-up helicopter or even from the container. Two wires are used from a launching device and are used to guide the missile on target. S510, called Tadzhurah by the French, can be fired around corners.

It is understood the initial U.S. Army order calls for delivery of some one thousand missiles. Of this amount, some will be delivered directly to the U.S. Seventh Army in Germany while the balance of the serials will be shipped to the U.S. for further open test and final program. S510 already has been tested in quantity by West German, France, Switzerland, Sweden and others. United States engineers entered a small quantity for test program.

Average speed of the S510 missile is about 300 fpm. Rocket uses a solid propellant motor. Funds circulate the main kill probability at 50%.

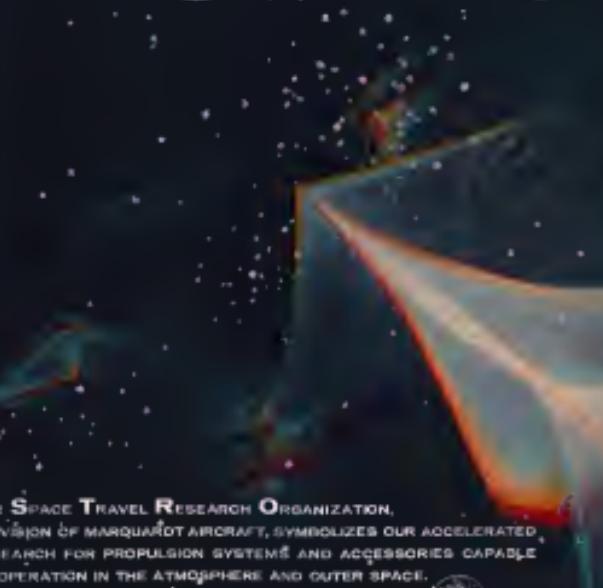
Aircraft Nuclear Propulsion at Marquardt



by
Roy E. Marquardt
President

MARQUARDT ANNOUNCES

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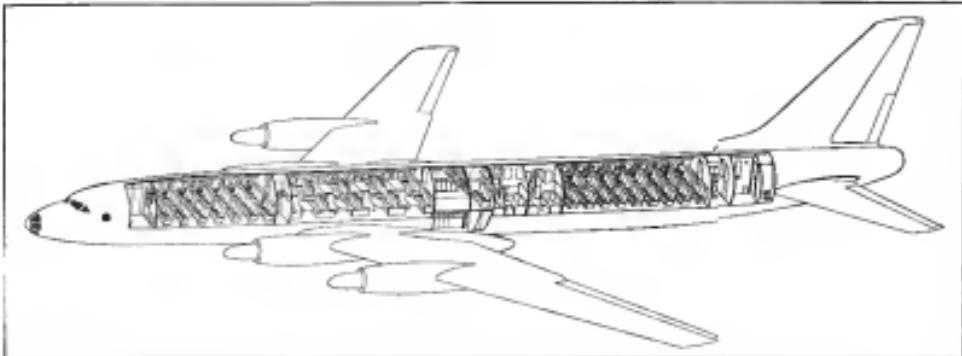
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**Pan American 707
Nears First Flight**

First U.S. jet to bear airline colors recently rolled out at Boeing Airplane Co. plant at Renton, Wash. (above). The Pan American 707 Stratoliner is expected to make its first flight sometime next week. Plane is the second production 707. Below, test production plane takes off from Seattle-Tacoma Airport following first visit to a commercial field. It landed at airport during U.S. equipment testing program.





DOUBLE-DECKER Tu-134 transport is designed in world, can carry up to 120 passengers on short hauls, 120 on intercontinental flights.

lower deck luggage hatch, cargo.

Soviets May Offer Tu-114 Turboprop to World Market

Soviets may put giant turboprop on world markets; low operating cost stressed over speed, capacity.

Moscow—Advanced testing of the Soviet Union's Tu-114 turboprop transport is stressing passenger-cargo economy and operational flexibility—first signs that the Russians may offer the huge four-engine jet to world markets.

Speed, high carrying capacity and long-range capabilities are not being emphasized, and the Russians are emphasizing the Tu-114 as the world's largest passenger-cargo aircraft with high speed that will compete with the best Russian and foreign aircraft.

However, a new note of economy has been injected into propaganda themes

with an emphasis, now for the Russians, on the low operating costs of the air craft. Undoubtedly, the Russians will use the nosecone angle as a means of "selling" the plane outside of Russia for prestige rather than profits.

Low Fare Level

According to Russian sources, designers have strived to hold passenger fares at the lowest level that will still allow them down to a par with first-class air fares. S. Tigr, chief of the Design-Build Bureau of Aeroflot, Sovetskoye Vozdushnoye, has the new Tupolev transport,

in 120- and 170-passenger versions, will be a prime threat to medium-distance long-haul travel in the U.S.S.R.

Ergo says the first Tu-114, which has the stretched 170-passenger configuration and at one nonstop flight will have a payload of 60,139 lb. He adds that the 120-passenger intercontinental model will be able to go at 600 mph maximum speed on long-haul routes to compete with the best turboprop transports offered by the Russians or other countries.

The 120-passenger version will be used as series from Moscow to overseas airports outside the Iron Curtain as a propaganda vehicle. Major cities are now told that any solid progress toward a bilateral agreement between the U.S.

and the Soviet Union for a New York-Moscow route will begin with after a flight of the 120-passenger model is available.

Moscow-New York Nonstop

The intercontinental will fly nonstop from Moscow to New York in 10 to 12 hr., according to Russian sources. The plane also will be used on routes from Moscow to New Delhi, Vladivostok and Peking.

In addition, the 170-passenger version will fly nonstop from the Soviet capital to New Delhi and perhaps will be used on air routes direct to Moscow-Birobidzhan and Moscow-Alma-Ata.

Ergo points out that on trips from Moscow to such southern vacation



NAVIGATOR cabin in Tu-134 nose. Sketch shows 170-passenger seating plan.

AIR TRANSPORT

spots as Saigon, Saeki and Melville Bay, two 120-passenger Tu-114s flying day and night will be able to move 10,000 passengers on an express train which requires two days to cover 1,000 miles. Ergo adds that in areas where ground traffic is subject to sharp seasonal changes, the double-deck Tu-114 can be used to handle large quantities of cargo and mail.

The Tu-114 is equipped with four Kuznetsov NK-12 engines which, according to Ergo, "are about twice as powerful as existing turboprop engines in long-haul planes." Engines are similar to the turbines which power the Bear bomber and develop about 11,000 shp each.

The plane can take off on three engines and continue altitude with two engines operating as afterburn. Landing gear is similar to the Tu-104's, having two main wheels each weighing 16,000 lb. and 70,000 lb. turning on an axle of about 1,500 lb. Axles in the passenger compartment are charged 24-25 tons per load.

Design Technique

The Tu-114 represents a major step forward for the Russians in developing design techniques that result in increased efficiency and lower cost of operation. Cargo and baggage has been made more accessible, pressure for fast ground handling are emphasized in the design and luggage compartments have been arranged to accommodate increased seating capacity.

Russia also have shown marked progress in utilizing high-density, most fuel-efficient, lighter metals. The Tu-114 is said to be the most fuel efficient aircraft ever built.

All versions of the Tu-114 will have four exits—one on each side of the double-pair forward of the fluid passenger cabin. Each version will be equipped with either six seats or three sleeping berths—two down and a folding upper berth. The economic seats apparently

and Vietnamese doors of cabin planes with an electronic nose!

Lightsabre assault from rubber sabres and planes are used in amateur contests organized by the British Ministry of Defense. Walls and ceilings are decorated in bright tones. Both the Tu-114 and the Tu-114 are a spacious comfortable plane called "Pravda" by the Russians to cover both decks so they can be stacked and cleared.

On the standard 170-passenger and intercontinental 120-passenger models, the forward cabin will be equipped with 45 seats arranged inheit for "business class" service.

Cabin rooms on both sides of the aisle serve as bulkheads to separate the forward and central passenger cabin on all three Tu-114 configurations.

Restaurant Facilities

Standard and intercontinental models will have a "Restaurant type" dining pavilion cabin with eight tables, each with six chairs. The tourist version will have 60 seats on the central cabin with two tables.

To the rear of the tourist cabin will be located the bath that will be connected with a lower deck, galleys by two electric elevators—one for heating, passed food, the other for refueling dirty dishes.

Thus the food preparation area is isolated from passenger cabin.

To the rear of the bath will be the right side, will be a staircase to the lower deck. On the left side will be a small cabin for the steward.

All versions of the Tu-114 will have four exits—one on each side of the double-pair forward of the fluid passenger cabin. Each version will be equipped with either six seats or three sleeping berths—two down and a folding upper berth. The economic seats apparently



PICKUP passenger cabin on the 104 shows western model in seating arrangement.

not included in the seat count of the 131-passenger model.

Both cabin in the standard version will accommodate 54 passengers in "second class," says those aboard on each side of the aisle. The long-range 129 passenger model has a first class rear cabin with more comfortable and larger seats for 25 persons. Total capacity in all seats will be up to the Canadian Air Transport Board.

With places still to be confirmed large訂ans and transoceanic routes.

On normal routes crew will consist of two pilots, navigator, co-pilot, radio officer and three stewards.

TCA Route Monopoly Ordered to Be Broken

OTTAWA—Plans of the Canadian government to introduce competition into its transcontinental air routes will break a monopoly held by Trans-Canada Air Lines since 1936 when the airline was founded.

Efforts to change the long-standing government policy against competition are disclosed earlier this month, when Canadian Transport Minister George Hogg said in a speech at Timmins, Ontario, that competition will be introduced into transcontinental routes if TCA has been prompted said May 12 without specifying to either side.

TCA Negro Hostess

New York—Trans-World Airlines has agreed to hire Negro flight attendants within 90 days as when the New York State Commission Against Discrimination has called a second major lawsuit through its action being of eight persons. Notarisk Airlines, last December hired Kay Taylor, a Negro, as a stewardess.

TWA, as president the association to make every effort to find a qualified Negro girl for the job, and no policy always has been non-discriminatory but it has not previously been able to locate qualified personnel. The other plan to "integrate and broaden" in recruiting stewardesses, the commission said told.

In another move, a discrimination suit against TWA has been filed prompted said May 12 without specifying to either side.

against the addition of a second carrier to serve the country's transcontinental routes because of the government's strict spatial competition. That a switch in government policy was in the making, however, was first indicated by a joint series last year which described Canadian Pacific Airlines' domestic scheduled routes transferred to another operator (AW Sept. 1, p. 47).

Both Canadian Pacific Airlines and Farley Western Airlines have filed applications with the Air Transport Board for route bids. Vancouver to Eastern Canada. At present, Canadian Pacific domestic scheduled operations are confined to Western Canada. Pacific Western conducts an extensive charter operation.

Hogg and discussions are to be held in the next few weeks with the U.S. on new routes between the two countries. However, before any new routes or intercontinental routes are awarded in the board, a study of the transoceanic route problem is to be conducted by Sir George Whittlesey, British aircraft czar, along formerly with British European Airways.

Canadian Pacific Airlines president, G. W. G. McConachie, and in Vancouver that his airline would operate under the Royal Canadian Air Force's existing contract on the de Havilland Comet 4 aircraft on any transcontinental route granted it by the board.

Strollers airlines at Eastern and West air Canada operating out of Winnipeg and Montreal, were expected to apply for route line rights to link the transcontinental routes with present operations in Northern Canada.

Hogg emphasized that competitive air routes offering domestic routes would also be required to serve points which need air service but which are not self-sustaining.

Turboprop Convairs Ordered by RCAF

MONTREAL—Ten turboprop versions of the Convair 440 will be built for the Royal Canadian Air Force by Canadian Ltd., Montreal subsidiary of General Dynamics Corp.

Aircraft, designated CL-66, will be powered by Pratt & Whitney Canada's TF30 engines and will be offered by Canadian Ltd. to world air forces as a transport and strategic bomber. They will be delivered to the RCAF this year. A \$40 billion deal with Canada has been demonstrated to the RCAF and now is undergoing U.S. CAA certification trials.

RCAF plans to have about 36 TF30 engines for \$7.7 million on initial order. Niagara production is planned to go to 12 to 130 engines a year. Canadian has orders for 12 engines for three RCAF Basler aircraft planes, plus options on

another 56 engines for the remaining 17 aircraft.

Convair Division of General Dynamics now is phasing out Lear production at San Diego, Calif., to make room for its 580 jet transport. Canadian will take over complete tooling status and set up production at Montreal.

Aircraft will be known as the Canadian officials feel confirmation of

previou aircraft with turboprop engines will go to Canadair's world-wide sales agent (AW Dec. 30, p. 64). New plane will have a gross weight of 33,200 lb. and will cruise at 305 mph carrying 48 to 49 passengers or 10,000 lb. of cargo at a 1,700 nm range. RCAF and CL-66 will complement the CL-44 four-engine turboprop aircraft Canadair is now building.

"shilly-shallyed propositions." It was no bad, Hogg said, that Eastern should have been subjected to harassment by both the flight engineers and pilots, and the engineers hoped that in future both crews would return from extracting proper collective bargaining.

Hogg said these were very real

losses for the flight engineers' "firms"

which probably would take over their jobs

with Eastern. Eastern deliberately chose engine-powered aircraft on its big aircraft instead of pilot-driven,

he said, and his felt that was ever since

and no one to change.

Civil Aviation Administration rules, he said, always have given the major the choice between the two types of powered and propellers that the rules might be changed to "pushy spec' planes." Eastern had requested and it doesn't plan to change its word. As regards to Phalon, the union did not want to stall that out for the CL-44 contract in that the proper crew complement of future aircraft cannot be specified at this time and the airline can't bring in a pilot to practice which might interfere with management negotiations in the case of safety.

Customs and the airline industry has avoided huge losses. One cause seems to be that return cargo gross at this stage of the aircraft's life reflects that a union should have in some balance an emergency board and ask for remedy."

W. Glen Hadrill replied to Trotter

that the "inangorous issue over the third man in the new cockpit" had resolved.

De Havilland-BEA Contract Near

London—British government has authorized British European Airways to negotiate with a de Havilland group for purchase of 24 de Havilland 113s to replace stage pt. 111s.

The status de Havilland currently has won on \$84 million contract and that the British Hovercraft Shipyards Gosport's Trident 200 has been reported, contact and grants most interest.

Although BEA has been on record for some time as preferring the de Havilland 113, the government has held off negotiations pending evidence of the de Havilland group's ability to produce the aircraft without incurring government subsidy.

As de Havilland spokesman said Aviation Week BEA authorities have stated themselves that the group including de Havilland, Hunting and BAC, have discussed, tested and produced measures to support the program without the aid of a subsidy of 24 aircraft.

Group spokesman, Avro, believes the de Havilland 113 project would look even after producing about 100 aircraft. Civil Aviation Ministry Health Welfare and Social Security Committee negotiations between BEA and Avro will get underway, and to settle final details of the contract, BEA has announced it will take options on 12 de Havilland 113s in addition to giving firm orders for 24 aircraft.

In accordance with government policy, BEA must data formal announcement of the order until after the contract is signed and the final flight approval by the treasury.

De Havilland 113 has three turbofan Rolls-Royce RR-314 bypass engines each having 1,490 lb. thrust. Since the engine has a higher bypass ratio than the larger Conway fans which it developed, it is expected to have lower fuel consumption and may yet need some improvement.

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American Cites Cost Of Switching to Jets

Washington—American Airlines told the Civil Aeronautics Board last week that high costs of converting to jet operations would send the carrier's expenditures for ground equipment alone up to \$95 million by mid-1960.

Testifying before the Board in the second phase of the General Passenger Tax investigation, American Vice President George G. Van Nistrom said his great cost of modernizing jet transportation will result in the expansion of ground facilities and training.

No one can say exactly what this year's expansion will eventually cost American. However, the present feasibility-expansion program revision places early expenditures somewhere to prevent obsolescence of jets at present airports without the radical changes in passenger loading which we know must be made eventually.

Van Nistrom told the Board that gate positions at airports must be equipped with special power, electrical sites and jet fuel facilities. Special tools shop and maintenance equipment is expected to cost \$14.8 million for 40 Boeing 707s and 35 Electras.

This is a very gradual rate of personnel, Paul W. Keenan, testified, but training for the jets will be required by over 12,000 engineers. He said that training each flight and maintenance personnel alone will be as much as \$8 million over the next three years.

Kremer said that American will purchase two flight simulators for training crew members at an approximate rate of \$1.6 million. He added that the largest single expense requiring financing for turbine aircraft are maintenance and engineering personnel. Between 1957 and 1960, he said, there has been a demand to training this group will number approximately 195,000 hours.

Second phase of the General Passenger Tax investigation covers long-range planning programs of the airlines. Both domestic trunkline and the Air Transport Association will testify in this phase of the investigation.

Teletype Link Speeds Teleregister System

Dallas—Dallas Airlines has speeded passenger reservation service by connecting its union telephone network directly to a new electronic reservation system built here by Teletronic Corp.

New system gives 140 Board of Trade offices in the U. S. a direct connection to an electronic system of reservation machinery control that has become increasingly popular with the nation's Bataan's union reservations an inveterate



Magic Lantern

Last July and August this column detailed the results of some all-weather (unrestricted) approach made at Andrews Air Force Base. Among the van was being tested here that search-light testing van that a test center for a training of which would accomplish starting the capability during Research. It had the appearance to achieve a remarkable step in this direction—a system designed by Ward Davis of Bureau's Unicam Inc.

In the van was of background, Davis while with the CAA many years ago worked with Ed Lusk on his first Link Trainer. Later Davis became the first operator of CAA's first simulator.

During World War II his talents in the training and simulator field were recognized in the Navy and to this day his interest in the subject has not faded. Mr. Davis has generously created this column with being responsible for the emergence of his device.

Simplicity Simulator's Virtue

Bureau's Davis' idea, called the Dallas Simulator (Dennis Approach, Landing and Takeoff), simplifies itself. It is an rule-stricken maze of wiring. It is an audience hall on which is pictured any type of approach in terms of lights or markings you care to see. If care to see controller and approaches Davis does too for that's what his knowledge would show.

The bell is just motion and simply photographed with a camera or TV camera. The bell is perforated at the proper places so that light falls uniformly on glass though an almost perfect reproduction of stereoscopic vision. Appropriate filters can produce any color you care to imagine. Although of sounds too simple to be true, the chance is left to the extent that one need not to use both images when bags is off to one ear, approaches Davis' theory.

Here is the way the device will be used. Take my simulator. Mount the movie projector atop the ceiling facing a screen several feet away. Use the remote control to the artificial horizon, altimeter, speedo, etc., and you go.

You can flap, roll, dive or pull up, the screen shows accordingly and the corresponding picture appears through your windshield.

Most Simulators Are Limited

Numerous other visual devices are in existence today in various stages of perfection. Most however their major fault good weather—conditions at the order of 3,000 ft. visibility and 4000 ft. altitude, down to as low as 600 ft. and 5 m.

While of course not for airport qualifications and for training relatively new pilots, etc., these are close airport limited. Practicing a landing approach at a given track, drying down the soap bar, the party has it completely ignore the really short hair conditions.

In contrast to this the Dallas device begins at 100 ft. ceilings and 5 m. visibility and goes on down to 300 ft. 300 ft. visibility—even less if you like!—it does! And that is the crux of the matter.

A pilot who can handle very low visibility shall does not have to wear about a 3 m. condition.

Thus, while we are seeing pilots to take some mighty expensive pieces of aerial art, and end up at some mighty inconvenient airports, let us at least consider them through most of the worse conditions. The Dallas device appears to be a good way to start doing this and it has the added benefit of being a relatively economical method.

Fast public thinking of "Dove's lantern" was stimulated for this month. From what I've seen, and what I remember of the Andrew trials, the audience will see some mighty realistic sights.

Better performance, comfort and appearance for your business airplane!



CESSNA 340 INTERIOR, STAR 340B, an AiResearch modification, combines high efficiency with light weight and smart appearance.



**Come to AiResearch for the finest
in conversion facilities,
workmanship and service**

The Garrett conversions illustrated are typical of hundreds made on all types of business aircraft, including DC-3s, DC-4s, Lodestar and D-5s. A single visit to AiResearch Avia-

tion Service can solve any conversion, modification or servicing problem you may have.

Here, in more than 150,000 square feet of floor space, we can install

new instruments, larger engines, extra fuel tanks, the finest in radio and avionics equipment and new, complete electrical and hydraulics systems. And we can provide the finest interior custom-tailored to your individual requirements.

In addition, we can supply all your maintenance needs from turn-around services to complete overhauls. You are invited to inspect our facilities. Please write or telephone for full information.



THE GARRETT CORPORATION
AiResearch Aviation Service Division

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Conversion and Modification • Custom Interiors • Electrical and Instrument • Radio and Electronics • Engineering Services • Full-Around Service

on 230 flights a day, for 31 days in advance.

Observing that Russell's is the first direct hookup of his land to the market, the airline's president, Charles E. Bond, said: "Without the advantages of the Telegporter system as we would see it in an age where no planes travel at such speeds that passengers aboard the aircraft would reach their destination before their messages concerning their reservation could be handled."

Eliminating the time-consuming operation of manually posted reservation control charts, the new hookup automatically transfers reservation messages coming by teletype into the British message center to the Telegporter desk.

Messages are received in Telegporter on four leased circuits and stored through two electronic editors which decode and extract messages at a rate faster than short on rental and local reservations. Incoming information flows from the data processor and to storage on a magnetic disk. The data processor runs simultaneously in parallel and are cross-checked.

Telegporter operates the aviation facility at a rate near Los Field and British leases the service. The carrier's present reservation load uses about half of the system's available capacity.

Telegporter operates reservations systems for Air Charter Airlines, National Airlines, Northeast Airlines, Pan American World Airways and United Air Lines, and the company is building systems for Trans World Airlines and Western Air Lines. None of these airline systems, however, is directly linked to a system-wide telephone network.

INSTALLATION OF NEW LAVES by AiResearch brings capacity to over 3000 gallons, adding new hours to range of Cessna 340 and 345. Extended fuel capacity also available for Cessna 440.

CESSNA 340 IN AIR MARINE BASE
as part of AiResearch conversion which includes radio, navigation and new instrument panels.

MAXIMUM SECURITY
an airline office is combined with the newest in comfort in the AiResearch custom interior conversion of a Cessna 440.



AIRLINE OBSERVER

► AiResearch continues to show some strength in market actions, despite the first part of last year's Capital Airlines bankruptcy, which delayed a \$197.5 million loan to Jan. 5, recently crashed to a high of 151 and has since one of the most active stocks among airline holdings. TWA also has been on active note, but the airline's large volume of trading has not changed in price substantially.

► Douglas DC-7 series has been certified by the Civil Aeronautics Administration to operate up to 20,000 ft., 3,000 ft. above the previous altitude limit. As yet, no airline has announced plans to boost flight altitudes to the new level.

► United Air Lines has broadened its management base by promoting seven officials to senior vice presidents and creating 17 new vice presidents. According to United President W. A. Patterson, the enlarged management staff is based upon an anticipated traffic increase in 1965 of more than double last year's volume.

► Chicago Helicopter Airlines' purchase of two additional Sikorsky S-58 helicopters (AWW Feb. 3, p. 48) brings the carrier's fleet of the 12-passenger helicopters to a total of five. The additional helicopter will increase seating capacity of present scheduled flights from 62 to 1,012 per day.

► Soviet Reuter drivers on Tu-104 aircraft flew the 6,350 mi. route from Moscow to Vladivostok in 12 hours during a test flight. An order is slated to place a Tu-134A in regular service on this route this month.

► Civil Aeronautics Administration granted \$8.5 million in loans for capital expansion and development in 25 states, bringing the total amount granted during the first seven months of the current fiscal year to \$52 million. Among the more sizable grants are Los Angeles International Airport, Cincinnati Airport and Tulsa Municipal Airport of Okla-
homa, R. J.

► Total of 180 international airbus have signed on Leoson with a future potential of 300 as a consumer of jet fuel for turbine aircraft operators. Agreements do not act as international standard or allow carriers purchasing JP4 fuel but in a major step toward marketing, supply, distribution and storage economies.

► Eagle Airways has been incorporated by a Civil Aeronautics Board executive to begin an on-call passenger service between Bermuda and New York. Eagle Airways expects to begin operations in the Bermuda legislature. The carrier will operate Viscount 800 turboprop aircraft from Eagle Airways Ltd. of England. The British firm also will provide pilot, maintenance and administrative personnel to conduct the service which contemplates an initial frequency of five roundtrips per week between Bermuda and the U.S.

► Ben Holton Humpert (D-Minn.) has introduced a resolution calling for an investigation of International Civil Aviation Organization's activities in the field of airport economics and airport user charges. Humpert charges that, although ICAO has never been granted the power to fix or regulate airport user charges at American airports, it has nonetheless undertaken to promulgate and administer throughout the world a standard pertaining to establishing principles governing all aspects of airport economics.

► Pan American World Airways will construct a jet terminal base on its Miami facility at a cost of between \$15 million and \$20 million. Construction will begin July 1.

► Trans World Airlines set an all-time January record last month by completing 98.3% of its scheduled mileage in the U.S. The airline scheduled an average of 273,000 en route flights and completed a total of 8,208,000 for the month. TWA credits dependability of winter flying, obtaining full use of its new \$25 million winter overhead base and improved operating and service procedures.

Airline Traffic—Year 1957

	Revenue Passenger Miles	Revenue Passenger- Mile (Millions)	Local Fleet %	M. & M.	Express	Freight	Total Revenue Tons-Miles	% Increase Over Previous Year-Tons-Miles
DOMESTIC TRAFFIC								
American	2,112,433	2,045,205	44.3	10,341,274	6,051,777	46,448,146	104,295,477	10.7
Eastern	2,000,000	1,925,000	44.2	10,341,274	6,051,777	56,577,176	104,295,477	10.7
Capital	2,449,844	2,323,304	19.9	2,187,072	2,371,007	8,416,957	121,384,118	10.4
Continental	310,330	243,254	12.9	3,040,290	4,057,641	7,845,030	59,397,569	14.4
Delta	2,454,200	2,351,504	44.2	10,341,274	6,051,777	46,448,146	104,295,477	10.7
Eastern	2,000,000	1,923,000	44.2	10,341,274	6,051,777	56,577,176	104,295,477	10.7
Midwest	1,231,301	1,157,209	10.9	10,341,274	6,051,777	46,448,146	104,295,477	10.7
Northwest	748,303	684,303	10.7	2,317,841	475,838	5,704,260	58,348,348	10.1
Trans World	4,157,311	3,841,729	50.2	10,341,274	6,051,777	56,577,176	104,295,477	10.7
United	4,157,761	3,841,764	50.3	10,341,274	6,051,777	56,577,176	104,295,477	10.7
Western	1,449,364	687,348	48.0	3,086,133	1,015,196	2,099,712	72,792,357	21.1
INTERNATIONAL								
Aeroflot	134,218	100,200	80.0	158,000	—	5,691	14,972,725	10.2
Alitalia	45,300	45,300	99.9	156,971	—	871,972	15,208,819	10.2
Caribbean-Afrikans	224,170	194,170	80.0	158,000	—	21,278	15,700,126	10.2
Cathay	100,340	87,271	82.3	158,000	—	1,000,000	15,700,126	10.4
Easair	318,870	264,459	55.0	1,059,359	—	1,311,819	47,263,410	23.28
Interavia	39,365	32,365	48.2	109,283	41,461	337,367	4,327,116	0.1
Interjet	—	—	—	109,283	41,461	337,367	4,327,116	0.1
Pan American	—	—	—	12,321,644	231,660	7,670,379	44,859,919	10.6
Aeroflot	—	27,370	10.0	456,719	—	7,321,219	11,861,010	10.9
Athens	1,054,370	1,051,922	60.3	12,372,837	—	26,471,630	111,689,449	93.4
Aurora America	—	—	—	12,372,837	—	10,000,000	119,259,317	93.4
Bogota	—	—	—	12,372,837	—	10,000,000	119,259,317	93.4
Peru	—	—	—	12,372,837	—	10,000,000	119,259,317	93.4
Panama	397,400	172,376	36.3	242,001	—	8,022,260	26,951,453	10.0
Trans World	395,400	172,376	36.3	10,341,274	—	9,786,010	15,713,809	50.1
United	100,860	80,364	46.8	1,079,167	—	918,219	37,459,875	10.7
Western	9,365	11,264	50.0	5,492	—	31,792	1,424,716	21.6
LOCARS								
Aeroflot	440,200	77,011	44.3	100,000	201,371	171,471	3,830,400	44.3
Alitalia	120,410	35,004	45.4	21,121	27,129	74,050	110,116	10.0
Carib	118,410	20,375	10.7	20,281	35,003	61,355	3,630,465	30.1
Frontier	218,340	26,343	80.0	314,820	91,189	793,717	4,790,130	40.3
Lake Central	201,340	26,343	80.0	314,820	91,189	793,717	4,790,130	40.3
Midwest	55,470	35,470	48.2	70,245	186,210	208,354	8,610,459	20.7
North Central	638,810	179,725	60.8	241,160	264,478	95,890,816	—	49.6
Qantas	260,732	49,624	41.4	133,370	184,130	184,434	4,384,379	—
Panair	—	—	—	11,110	11,110	11,110	11,110	—
Peru	211,316	16,316	80.0	91,555	126,737	2,433,434	2,433,434	20.2
Southwest	957,239	72,359	55.0	133,100	24,197	70,012	3,416,334	51.6
Trans World	545,340	50,333	38.4	561,480	61,353	161,204	703,343	50.7
West Coast	254,052	62,333	62.00	63,890	254,449	58,943	4,440,120	42.70
TRANSATLANTIC								
Aeroflot	—	42,107	28.9	41,124	—	1,129,407	6,216,394	55.7
Trans-Pacific	180,148	58,702	58.0	12,119	—	116,540	8,310,394	—
CARGO								
American and American Flying Team	107,771	470,239	87.4	68,470	420,114	6,441,723	6,446,727	61.7
Delta	—	—	—	51,715	323,333	51,236,271	20,267,368	73.8
Rockwell and Western	4	201,194	99.9	200,340	719,363	12,918,744	46,190,636	74.7
Fish	71,127	217,000	99.99	—	—	49,797,053	19,287,177	77.09
HELICOPTERS								
Chicago Helicopters	55,210	87.1	24.4	21,671.3	—	—	101,956.6	35.6
Los Angeles Airways	21,283	1,130	81.6	46,416	22,501	—	127,329	50.4
New York Airways	—	1,129	99.9	—	11,407	7,027	166,481	41.4
RAILROADS								
American	87,021	34,317	48.3	355,494	—	1,310,377	3,640,119	48.0
Akita Central	51,461	4,449	42.9	41,116	—	41,464	41,464	—
Golden	17,720	3,120	18.2	42,161	—	1,011,311	1,192,770	95.2
ETS	43,788	3,345	58.5	34,367	—	32,345	408,352	50.7
Pacific Northwest	107,479	108,319	50.8	1,127,159	—	2,104,043	33,446,461	50.8

*Not available.
Compiled by Airlines Week from airline reports to the Civil Aeronautics Board.



HOW TCA CHOSE THE VICKERS VANGUARD

In announcing the decision of Trans-Canada Air Lines to purchase twenty jet-prop Vickers Vanguards (with an option on four more), Mr. Gordon McGregor, President of TCA, said:

"Our decision to order the Vanguard came after the most exhaustive equipment analysis ever undertaken by the company. The evaluation was made over a period of two years, during which ten other competing aircraft were thoroughly examined."

Here are the seven reasons—



Why TCA chose the jet-prop VANGUARD as its medium-long-range airliner

THE MARKABLY COMPETITIVE COSTS

TDS joined the Vanguard switch to the mid-term election, but the days before the election brought negative insights. Mr. McGroarty commented, "We expect to operate in a dramatically less assault-oriented environment." TDS has been held in abeyance for under 50% of its capacity.

2. MIT ORTHOG FLUXIBILITÄT

The England will be the
final frontier. Major cities
will expand probably to
200 to 250 mile stages. Eu-
ropean zones center in
Eight broad developed
belt of great cities. With
well balanced passenger
and freight service it will
lead to one-way traffic.

3. GREAT PASSIONS CANNOT

Powerful Bull Brings Tuna
Engines and makes the *Democrat* a winner amidst
contests. Whether very well
designed, there is no question
about engine durability. For
decades now and silent
years, the *Vanguard*
offers the most consistent and most
dependable installations.

4. FRONTIERETTE

The new Vanguard is a projection of the Standard 300 propeller. It will move land aircrafts that fly at 300 mph at 10,000 ft. It has a 300,000-hp Pratt & Whitney engine. Another big plus will be its range of 10,000 ft. The aircraft is scheduled to begin flight testing in 1968.

第5章

The Vanguards will be based at Heathrow until their final flight from the UK in 2010. It carries up to 10 passengers and its engine length will put it among

RIGHT

The Neoguinean paradise dove is best known from classic publications by Kuroda, mostly as an endemic hypoleucistic subspecies with large dark eyes and white head feathers, deeply plumaged, with long tail feathers, and pale greyish wings.

*P. quick t. 200 abou
base of main stem*

The Nasound 3000 series offers an ideal, low-priced entry-level printer for small businesses, service-type establishments, restaurants, classified ads, large stores, bars and off license, bright and spacious desks, paper-handling tested. Standard power-supply supplied.

NEWEST from the world leader in jet-prop aircraft...**VICKERS**
TCA's routes and requirements are very similar to those of many American
carriers. In fact, 30 of the 100 busiest routes in the U.S. can be economically
served by the giant new jet-prop Vanguard. A Vickers engineer—thoroughly familiar with the problems of American lines—stands ready to
answer your specific questions. If you would like more information, at your
convenience, simply contact Christopher Clarkson, U.S. representative, 70
Rockefeller Plaza, New York 20, N.Y.

jet-prop **VICKERS VANGUARD**

¹⁰ See also the discussion of the relationship between the concept of ‘cultural capital’ and the concept of ‘cultural value’ in the section on ‘Cultural Capital’ above.



Front section and anti-surge booster of modified Jupiter-C satellite carrier are shown after mating at Army facility, Cape Canaveral.

Army, JPL Assemble Jupiter-C Satellite Vehicle

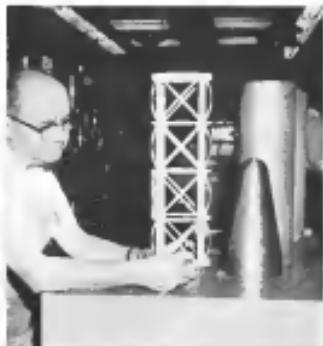


Modified Jupiter-C nose section containing guidance system is lowered from trailer transporter at Army's Cape Canaveral facility.

MISSILE ENGINEERING



Bleeding jet嘴 driver, designed to hold the instrumented capsule on the Army's satellite, is machined at the Jet Propulsion Laboratory, California Institute of Technology.



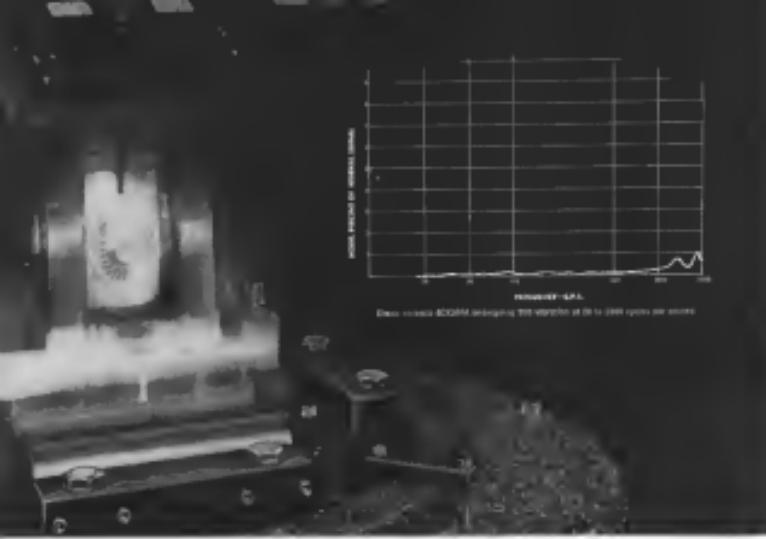
Modified flight section shown is expected by Jet Propulsion Laboratory engineers. Shows, containing instruments, will be mounted on satellite's thin steel core and nosecone.



Instrument component of the satellite launched by the Army is prepared for static test at California Institute of Technology's Jet Propulsion Laboratory. Test was designed to simulate environment encountered in launching, space.



Instrumented, stainless-steel upper section and the first-stage solid-propellant motor (these sections were developed jointly by the Jet Propulsion Laboratory and the Army) Assembly weight 54.4 lb. Overall length = 50 in.



Surviving Vibration is an Eimac Ceramic Tube Extra

High reliability in severe environments is an important solution factor represented in manyeronnuclear applications. An important aspect of this reliability is a tube's ability to operate under extreme vibration without electrode damage, insulating noise or developing interelectrode short circuits. Eimac ceramic design incorporates many advanced features that improve tube performance under these conditions.

In the illustration an Eimac ceramic 4C3300A, 300 watt triode, is being operated in a circuit while undergoing 20G vibration at 30 to 2000 cycles per second. The exceptionally low noise level, predicted under these conditions, is shown in the graph.

above, remains less than 1% of normal signal over the entire test range.

Other advantages of Eimac ceramic tubes are resistance to damage by shock or high temperature, compactness without sacrifice of power, ability to withstand rigorous processing techniques that lead to high tube reliability, uniformity and longevity.

In its new line of ceramic tubes, Eimac has the answer for the aerospace engineer who needs a tube that will deliver full output under extreme conditions.

Write our Applications Engineering Department for a copy of the new explanatory booklet "Advantages of Ceramics in Bedside Tubes."

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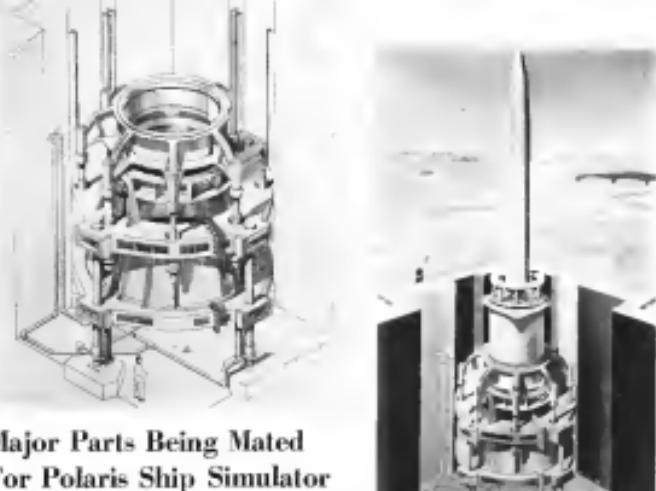


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Negative Grid Tubes
Relax and Amplifier Rhythms
Ceramic Receiving Tubes

Vacuum Tube Accessories
Vacuum Switches
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Includes the most extensive line of ceramic electron tubes.



Major Parts Being Mated For Polaris Ship Simulator

New York-Rapal project is being built by completing a 285,000 ft. ship model simulator being built to support Navy's Polaris underwater stage infinite missile to the three separate sections of a ship launch, roll and pitch.

Structure which was designed by Lockheed-Georgia Division, Bobino-Louis-Hamilton Corp., is designed to duplicate motion in which the Polaris would be subjected if launched on the deck of a ship, such as the nuclear-powered guided missile cruiser USS Long Beach, or thrown by an atmospheric missile. Although both the same basic control system whether the missile is deck-launched or atmospheric-launched, there is a considerable difference in missile's center of gravity location in relation to ship center of gravity. If deck-mounted missile and ship center of gravity are vertically separated by a considerable distance, if submarine-launched, centers of gravity are relatively close together. Lincoln's simulator provides an adaptor which makes it possible to locate the missile so that the center of gravity will be centrally located for either condition.

Contractor of the massive machine is supporting a Bethlehem Steel Co.'s Bethlehem, Pa. plant, where major components are being made.

At Peoria AFB, Ill., a 100-ft deep concentrated pit designed to house



solve the problem to the pilot can come from alternative solutions. He may be obliged to choose the lesser of two evils and a go/no-go presentation will not much help in evaluating them, according to the speaker.

Gen. Flanagan said that the recovered weapons system is an excellent and striking advertisement of the safety and dependability which our forces in an unarmed missile. A recoverable munition system is an over-the-horizon transportation and can be deployed quickly and easily to sustain the enemy with a high-state shelf gear. The fact that it is reusable makes it possible to save

the system continually and some the reliability of all its parts. To save the recovered system with equal reliability would be economical because of the high expenditure of counter systems. As indicated, Gen. Flanagan said that two working groups in each of the four lead-and-follow-and-sensor fields of the program are being used; each major USAF research and development agency have been invited. He said the groups have been in almost continuous action for six weeks, contrasting USAF's progress in the blue scenario toward space flight under the leadership of Col. Paul Stapp.



SHelter for Thor IRBM is portable, well-protected shield from weather, wind.

Thor IRBM Hangar Under Construction

San Antonio—Portable shelter for the Douglas Thor IRBM has been designed by the Southwest Research Institute, and prototype shelters are now being built by Minite Engineering Division of Douglas Aircraft Co.

The longer will provide shelter for the intermediate range ballistic missile at its launching site. It will protect the missile from a wide range of hot and cold weather conditions, and it is being so strengthened as to be up to 170 mph. When it is set up, an external power source will furnish a shock from the missile to the weapon can be created as an fuse pad. Detachable, four-wheeled trailer of the shelter can be rolled away manually.

The shelter is dismountable, and its largest component measures 5 x 15 ft. It is not transportable, as is the Thor missile. Since the Army's Jupiter IRBM is smaller than Thor, the longer could conceivably be used for that weapon also. This longer was designed by Southwest Research Institute scientists under a Douglas contract. Douglas engineers responsible for developing the actual hardware.

Electroplating Company Studies Thor Nose Cone

Burt Manufacturing Co., Bellville, N. J., electroplating firm, is working on methods of protecting the nose cone of the Air Force Thor intermediate range ballistic missile from friction during re-entry.

Agreements recently completed between Orenda and Curtiss-Wright to jointly manufacture of the Iroquois engine in the United States.

We are proud that Orenda chose a Bendix-designed jet ignition system for the Iroquois. Serviceability, reliability, and extended overhaul life are inherent factors of all jet ignition systems built by Scintilla Division of Bendix Aviation Corporation.

Orenda Aircraft, Astoria, Oregon 97101, 200 Innovation Rd., Belmont, P. O. Box 10000, Belmont, Massachusetts 02159

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**STURDY, FAST ACTING
RESISTANCE BULBS BY LEWIS**

FREE AIR TYPE
MS28038-1
to MIL-S-8598

THREADED, PROBE TYPE
MS28034-1 and MS28034-3
to MIL-S-7490

**CYLINDER HEAD,
BAYONET TYPE**
MS28034-2 to
MIL-S-5497

**PROBE TYPE,
WITH ADJUST-
ABLE STAINLESS
STEEL STUFFING-
GLAND**

FOR DEDICATED TEMPERATURE MEASUREMENTS, USE
LEWIS BULBS WITH LEWIS RESISTANCE THERMOMETERS.

the LEWIS ENGINEERING COMPANY
HAWTHORPE, CONNECTICUT

AIRCRAFT TUBING

GOVERNMENT SPECIFICATION TUBING IN STOCK

4130 GRADE	4135 GRADE	1025 GRADE
+ AMS - 8371	+ AMS - 8367	+ MIL-T-5064
+ MIL-T-8735	+ MIL-MW-8506	+ MIL-T-8732

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LOS ANGELES, CALIFORNIA**

read'i-ness: when a fighter as new as tomorrow is in service with the Fleet today

There's a bright, new glint to our Fleet today.

Chance Vought's 1,000-plus-rpm *Crusader* has arrived—in strength! This newest fighter was designed a champion—in speed, ceiling and firepower. It was engineered, too, for swift production and for smooth introduction to pilots.

This sped the *Crusader* to duty faster than any modern jet. It brought to the Fleet in an age of pilot training that will hold its edge.

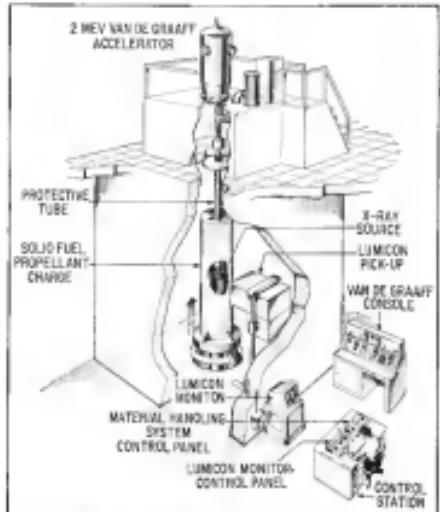
With the *Crusader*, comes a new realm of four-figure speeds. Already, Navy and Marine pilots have tested its performance to break major world's records. Their unprecedented supersonic and canard-to-canard cross-

logs of the U.S. signal a new chapter in missile aircraft speed and mobility.

Today, squadrons of *Crusaders* sweep the skies above the sun. Their trophy-winning performance adds unmatched combat strength to America's power for peace.

Scientists and engineers pioneer with Vought in new missile, missile aircraft, and electronic programs. For details on other openings write to C. A. Bellis, Superintendent, Engineering Personnel, Dept. M-3.

CHANCE VOUGHT AIRCRAFT
INTEGRATED DESIGNERS
DESIGNERS • BUILDERS • TESTERS



KALAT inspection equipment for solid fuel rocket engines (above) may allow Thielert Corp. to verify homogeneity of 18-ft-long charge in 35 min.

X-Ray Probe May Eliminate Flaws In Solid Propellant Rocket Fuels

Solid propellant rocket engines with vertically oriented nozzle ports are expected to result from new X-ray inspection equipment being built for the Thielert Chemical Corp. by High Voltage En-

gineering Corp. and Brooks Free-

stateful manufacturing procedures have kept solid fuel engine reliability around 95%, but Thielert believes X-ray inspection which can detect the deepest flaws in the propellant charge will practically eliminate engine failure.

Faws in the charge, such as cracks and holes, can suddenly become burn surface and combustion pressure in the engine and cause a catastrophic explosion.

New inspection setup is shown in the accompanying sketch. A hydraulic lift raises and rotates the solid propellant charge around a "wand" which directs X-ray radiation through

the charge. The X-rays are generated by a two-million-volt Van de Graaff linear accelerator and are picked up by

a Luminescent probe at the nozzle end.

The Luminescent probe is related in closed circuit TV to the operator's position. The highest luminescence in the charge results in an alteration in the cathode bombardment of the Luminescent probe and is picked up usually by the operator.

The first X-ray inspection equipment will be installed at the Thielert plant at Longview, Tex., during the month and March. It will be able to handle an 18-ft. long.

The Van de Graaff linear accelerators will be built by High Voltage Engineering Co. of Longview, Tex. Brooks Free-

stateful equipment is being planned and will be built contingent on the success of the apparatus at Longview.



2 X 2 = BURF

The simple mathematics of missile experts now hints at the need for people reeducation. The missile warhead was purported to have weighed 1,120 pounds. This was accepted as a safe rule of thumb — that each payload pound required 1,000 pounds of propellant. The warhead's reported power should be 1,120,000 pounds. The experts expressed figures ranging between 600,000 and 1,000,000.

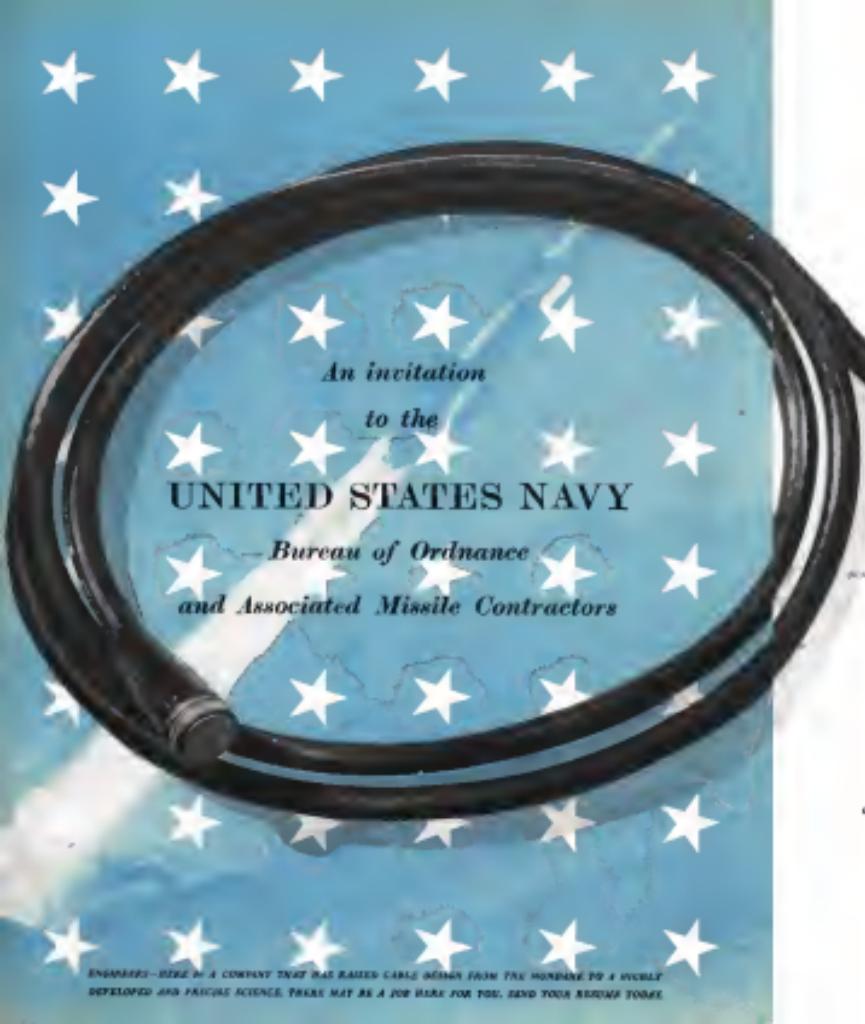
More targets, more fuel, more time, more weight, more weight, more thrust, about as much and will get even more. Reengineering should tighten, strengthen materials; more powerful propellants.

So long as the shape of thumbs is circular, rounded and swollen rings will be used to hold them. Certain missile systems, however, eat certain rings. Parading out certain rings to Klein's eye business, he said, "I'm not sure you've seen several years we've been supplying jet engine accessories with solid rings. We're still at the point of the lowest reject rate to the business."

He believes we have something to contribute to the missile program. He said, "We can produce a little more than the average small company because of our engineering and design. We can also contribute to our research programs, turn out pilot programs, and help develop new products to handle produc-

tion runs.

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FIFTH WHEEL CO.
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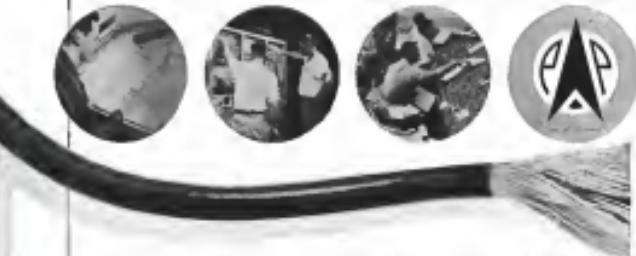


INTRODUCTION

This is an invitation to utilize the missile systems engineering services of Pacific Automation Products, Inc., an current and upcoming Navy missile program.

ABOUT PAPI

PAPI offers the following services in the cabling and activation of missile test and launch facilities: Systems Design—working from blueprints, PAPI design engineers will determine every conductor that is needed to link block houses, control centers, terminal rooms, and stands or platforms. Cables are designed to effectively accommodate these conductors, and include break outs, connectors, and accessories. Systems Fabrication—cable assemblies from our plant in ready-to-install condition, with rigorous quality control procedures governing every step of the fabrication process. Systems Installation—PAPI's experienced personnel and proven methods are utilized in field installation of all inter coil cabling, instrumentation, recorders, transducers, controls, consoles, and accessories.



PRESENTATION

Systems Checkout—PAPI specialists checkout all circuits for conformity to specifications, confirm the operation of each instrumentation system, and validate the fire and launch control functions.

Systems Demonstration—working drawings of the entire installation are supplied in approved form.

MANUFACTURE

PAPI is an efficient organization of 600 persons, 130,000 square feet of floor space house engineering and production capacity to meet any workload. Because PAPI cable components have been used in Navy projects, including Vanguard and the Regulus missiles, you know our product to be reliable. PAPI's systems engineering services have been used on other missile programs with these results:

- All sites and facilities are being completed on or ahead of schedule.
- 16,000 cable components are now in service, with no malfunctions due to cabling.
- Costs have been far less than predicted.

Superior designs and simplified operational characteristics have marked each facility,

One special interest will be PAPI's Water Tight cable, which soft water cannot penetrate at 500 fathoms. It is ideal for underwater umbilicals.

Because the mechanical and environmental capabilities of PAPI cables often permit great simplification in the design of missile facilities and savings in cost, an early visit by PAPI with site or facility builders is recommended.

CONCLUSION

PAPI's engineering staff includes men with outstanding experience in every phase of the missile business. It is no accident, therefore, that we use the "take charge" sort of people who can take full responsibility for providing the services described in this message. We hope that you will accept this invitation and plan to utilize PAPI's great practical knowledge and expertise in missile facility cabling and activation.

Arthur P. Auer
ARTHUR P. AUER, EXECUTIVE VICE PRESIDENT

ENGINEERS—HERE IS A COMPANY THAT HAS RAISED CABLE DESIGN FROM THE MONOTONE TO A HIGHLY DEVELOPED AND PRINCIPAL SCIENCE. THERE MAY BE A JOB HERE FOR YOU. SEND YOUR RESUME TODAY.

PACIFIC AUTOMATION PRODUCTS, INC.

2900 AIRPORT, GLENDALE 3, CALIFORNIA. Phone: Chapman 5-6172 or Glendale 4-6172

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the entirely NEW
insulated
AMP terminal line
for large wire sizes

FEATURES:

- High Performance Nylon Insulator to provide continued satisfactory service life at elevated temperatures, plus resistance to water-based oils
- Integral ferrule design to secure maximum structural utility at minimum weight penalty
- Crimp insulation has formed entry steps to provide easy wire insertion and snug fit over standard AWG wires
- Color-coding to assure proper terminal selection for applicable wire sizes
- Step-Lok Crimp® insures confirmed proper position of insulation with respect to terminal
- Connector designs are available in single to single, single to multiple and multiple to multiple wire combinations

The A-MP Ampli-NYL Terminal is manufactured with the proven Conform "C" Crimp for maximum electrical and mechanical performance. Confining the spread of the terminal during the crimping process advances more intimate contact and a homogeneous union of conductor and terminal.



Additional information is available upon request.

AMP INCORPORATED

GENERAL OFFICES: HARRISBURG, PENNSYLVANIA

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transport into refueling tanker. Tanks are mounted off center station. Closed circuit television, consisting of two cameras mounted in left section of airplane, gives refueling operator view of aerial refueling procedures. Each camera has a built-in video tape recorder to record all flight deck.

Additional monitors in cockpit allow pilot and copilot to view refueling operation.

Signal system uses multi-colored lights to direct receiving aircraft onto drogue. A drogue is installed in lower aft fuselage near television cameras.

Modification provides for 14,000 gal of fuel in wing tanks and an additional 4,000 in the four fuselage tanks.

Swiss Buy Hunters, Pay \$73.2 Million

Geneva—Swiss government has approved purchase of 100 Hawker Hunter F.G. Mk.50 fighter-bomber Group, Ltd., or do, is worth \$73.2 million. Delivery will start later this year and will be completed during 1959.

Approval was granted after a long series of evaluation trials of several other foreign aircraft which failed to surpass the others in the Hunter and the Swiss-built FFA F.35 (AW Sept. 16, p. 45).

Whether a further order for a series of 100 F.35s will be placed at the present stage in the Swiss Air Force's replacement program will be the subject of post-treaty debates in Bern next month.

Export and oil-shale orders for the Hunter had reached the \$160 million level some time ago. Since then, Hawker received an order from India for about \$72 million. With the series of 100 Hunter for the Swiss Air Force, that country will have named more than half a billion dollars in foreign contracts, which makes it Britain's most successful military plane.



Hailstone Blowpipe

Compressed air blowpipe tests ballistics of 373 mph against Cooper SII skin resistance in weatherability test.

Edgewater rings



or welded



Uniform, dependable, accurately made Edgewater Rings are furnished in a wide variety of cross-section shapes, and in diameters from 5 to 145 inches. They meet the most critical specifications and standards of quality.

Representative applications include bearing races, jet engine parts, parts for missiles and rockets, gears, grinding rings.

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To a physicist with experience in mechanics, electronics, magnetism and acoustics, we offer an unlimited capacity for creative achievements. Telecomputing Corporation will offer this directorship to a man who has acquired his Ph.D. in Physics since 1950, and who is earning a minimum of \$85,000.00 annually in a large company. ARE YOU QUALIFIED TO FILL THIS IMPORTANT POSITION? Please forward resume to Wm. R. Whitaker, Pres.

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TELECOMPUTING CORPORATION DIVISIONS:

WHITAKER CONTROLS DIVISION (Formerly Wm. R. Whitaker Co., Ltd.) Responsible for the development of the first sliding gate valve (1948), the first motor-driven gate valve, and many other firsts in equipment designed to meet specific military applications. Since 1948 this important division of Telecomputing has produced over 1,200,000 valves. Every military aircraft in service is Whitaker Controls equipped.

WHITAKER GYRO DIVISION Since 1939 more than 350,000 Whitaker gyro's have been sold for installation in a wide variety of military products. This division originated the electrically-driven gyro being used on guidance systems and on missiles currently in production.

DATA INSTRUMENTS DIVISION (Whitaker) A leader in research and development in advanced electronic systems, encompassing the fields of safety controls for military and commercial aircraft—airports—communications—radio—IPF and navigation aids. Today, every ship of the U.S. Navy is Whitaker equipped.

DATA INSTRUMENTS DIVISION The Data Instruments Division is engaged in the development and manufacture of proprietary instruments for data processing. This division designs data reduction systems and has its own complete data reduction facility. It designs and produces the Data File System equipment, a system for completely automatic inventory control.

NUCLEAR INSTRUMENTS DIVISION For many years this division has been engaged in the production of maximum reliability equipment for testing nuclear weapons. It is grossed to undertake basic design and manufacture of missile instrumentation test equipment, develop prototypes and apply engineering techniques to assembly line production under the most rigid quality controls.

RADIAL INSTRUMENTS DIVISION This division is currently engaged in the reduction of large amounts of flight test data being generated by the daily missile flights on the integrated Ballistic-White Sands Range. The Engineering Services Division of Telecomputing is capable of performing this function anywhere in the world.



TELECOMPUTING
CORPORATION

101 NORTH CLOUD AVENUE,
LOS ANGELES 36, CALIFORNIA



BURROUGHS SYSTEM STUDIES... MORE AIR DEFENSE INSURANCE

ONCE AGAIN ELECTRONIC COMPUTATION AT WORK HELPS RESOLVE A VITAL PROBLEM

Ensuring safety of assault or real time speed-dial and when they should come—in a mix of modern defense. And high speed computation applied through a System Study makes this possible.

Suppose, for example, enemy or missiles are flying in on target from several "in-clusters" at once. How do we group their speed, location and relative priority? What usage the best available weapons to obtain the kill?

The U.S. Army Signal Corps honored Burroughs Corporation this objective. We evaluated the military problem and developed a technical analysis known as MATASE (Multi-sensor Air-to-ground Target and Artillery Evaluation). Using MATASE, Burroughs Corporation is continuing the System Study which will determine the ultimate defense weapon system.

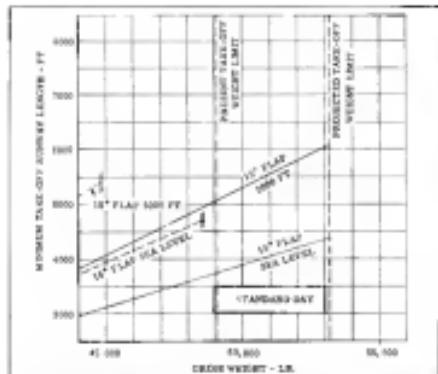
In such System Studies, again you see Burroughs of work, analyzing and resolving problems for the military—and for civilian industry, too.

Engineers like further System Studies are welcomed in any and all areas at our proved competence. Write, call or write Burroughs Corporation, Defense Contracts Organization, Detroit 32, Michigan.

BURROUGHS
CORPORATION



THE FOREMOST NAME IN COMPUTATION



WINGSPAN jet takeoff, measured with no preceding engine, is shown by dotted lines in the chart. Designers claim by jet can cut hold length 14 to 25%.

Convair 440 Wingtip Jet Engines Interest Five Overseas Airlines

San Diego, Calif.—Five airlines have selected interest in a Convair Matadorine 440 modification which would combine wingtip jet engines with the aircraft's twin Pratt & Whitney R-3350 CB1 conventional powerplants.

Convair officials said interested airlines are Sabena Belgian World Airlines, Swissair, Airline (Vancouver), Iberia and Alitalia. Latin American airlines also showed interest.

Additional jet thrust to Matadorine 440, according to Convair, will provide

- increased climb speeds over short ranges
- reduced takeoff distances and lighter rate of climb
- increased payloads when operating from high altitude airports or at high temperatures.

Two Engines Offered

Proposed turbojet engines offered for the modification are the Fielder 300 FT 301E (version of the J40), and the Com悲well 552.2 (version of the J61). Both engines now are in military service.

Convair said jets also can be installed on its Model 340 and present production derivatives, as well as those currently in use by airlines.

AIRPORT WIRE, February 17, 1968



HG-25MR HG-25SMR

CONTACTS
1 in. 2 pole, Form A, B or C
CONTACT LIFE
100,000 cycles or 10 months or 100,000 VAC
CONTACT VOLTS
100 to 250 V, depending on current
COLD VOLTS
100 to 250 V, depending on current
RESISTANCE
Up to 1.00 ohm
IMPEDIMENT
None
TEMPERATURE RANGE
-40° to +125° F, standard
-40° to +158° F, optional
OPERATING 1000 C
NON-OPERATING 1000 C
VIBRATION
2 G, 10 to 20 Hz
SHOCK
100 G, 10 to 20 Hz
STORAGE
-40° to 158° F
DEMCO



HG-25MR HG-25SMR

CONTACTS
1 in. 2 pole, Form A, B or C
CONTACT LIFE
100,000 cycles or 10 months or 100,000 VAC
CONTACT VOLTS
100 to 250 V, depending on current
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NON-OPERATING 1000 C
VIBRATION
2 G, 10 to 20 Hz
SHOCK
100 G, 10 to 20 Hz
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LATITUDE 58—ALTITUDE 200

The International Geophysical Year is a period of intensive study of the earth and its atmosphere—an all-out cooperative effort of American science and industry.

During IGY, Project General's Aerobee High research rockets will focus a scientific eye on the ionosphere, 200 miles over Ft. Churchill, Canada.

The data obtained will make invaluable contributions to aerodynamics, astrophysics, and the physical sciences.

Aerobee's Aerobee has been synonymous with all-weather reliability and low-cost atmospheric research for over a decade.

Aerojet-General CORPORATION
A SUBSIDIARY OF THE GENERAL ELECTRIC COMPANY
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Gozelle Jr., Repowered

Small biplane version of Gozelle Junior first turbine engine will be taken from 920 deg. to 1,070 rpm after short development period, according to Japan Engine Inc.

1,000 ft. with the 360 engine. Figures are based on maximum takeoff weight.

Modified Metropolitan 440, using maximum continuous power in its recuperating engine and normal rating on the 144 rpm jet, can climb at 36 at 10,000 ft. min. at 1,450 bhp. Addition of 30% can produce 90 mi./hr. climb in 27.5 min.

On long range cruise, turboprops are shut down when gross weight is reduced to 49,200-49,500 lb., depending on altitude. Cruise then is continued at maximum continuous power in recuperating engine. Below this weight, jet thrust is required for climb. At 10,000 ft., 100 lb./min. of oxygen is required for compensating engine operation.

Landing on a standard day at sea level, field length of maximum weight is about 4,400 ft. Through air there are no provisions as yet of tail flap for landing and landing below the 5,000 ft. altitude.

Engine Installation

Cutter arm type jet installation is "straight of possible without violating aerodynamic efficiency," requires "minimum installation." Engines are mounted in counterflow; their point arrangement from a saddle-shaped portion of the upper nacelle structure which is primarily attached to the wing tip. But of nacelle is supported from engine and can be lowered in ground stalls in contact with the engine, to allow rapid service change.

Gozelle's aft portion is constructed

of aluminum and to prevent the damage to wing and engine mounts. External part of nacelle and inlet duct is made of aluminum ribs. Pipe detection and extinguishing system provision will be made.

Wing modification consists of strengthening portion of spar box with heavier gage in mind as spar webs and skins and spar end reinforcement. New wing tip integral with engine mount structure is introduced. Fuel tank is extended outward and capacity increased to 2,000 gal.

Separate fuel system is added for nacelle with fuel drawn from inboard ends of main tanks. Booster pumps are

added at exhaust end of each tank. Jets have separate oil systems. PHM uses a non-explosive of open type which does not require an oil cooler. PHM has a separate oil tank and bypass and a system of oil cooling. Oil tank for reciprocating engines will be integral due to increased fuel capacity.

Windmill Protection

Since turbines must be inexpensive during part of flight magazines have developed methods of preventing windmill drag. Systems include two safety shutoff discs pivoted from a vertical post. Discs rotate 45 deg. on each side to close off shaft, thus forming a "closed



NEW CONCEPTS IN CONTROL PERFORMANCE

Breaking the static barrier required radical departure from many conventional designs and techniques. Efforts to conquer the mysteries of the thermal barrier will call for even more advances in materials, instruments and concepts.

Aerotec engineers have learned to take a long, hard look at the most farfetched ideas... for some of these ideas have been developed into instruments and controls that are helping make possible faster and safer flight... as well as helping to advance the nation's missile program.

If your instrument or control problems call for a new concept in design and performance, Aerotec engineers can help you. Contact our Project Engineers today.



Peter-Brown THE THERMIX CORPORATION Greenlawn, Conn.

10 offices in all principal aircraft centers

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THE AEROTEC CORPORATION Greenlawn, Conn.

Resistance Welding Jet Engine Parts



HELPS PUT PROFIT
INTO MANUFACTURING

Heintz Achieves Volume Production with New Scialky Counter Control Welders

In fabricating and job shops, where a wide variety of assemblies must be welded to rigid specifications every day, Scialky resistance welding helps keep production schedules accurate.

The Jet Engine Division of the Heintz Division, Kolling-Heyen Company, a large Philadelphia aircraft fabricator, manufactures original and replacement parts for the aircraft industry. This means their production must meet exacting jet engine specifications.

New Scialky Counter Control

To help meet these requirements, Heintz now uses Scialky Extended Three-Phase Resistance Welders with the new Pre-determined Electronic Counter Control. This system provides precise control of all welder factors for absolute production consistency. All control settings are random and with extreme accuracy, and are readily established at any time to duplicate previous production runs. The machine cannot deviate from its setting.



Fig. 1 Scialky welding station in Heintz's jet engine fabrication shop. Note single leadline used.

The Scialky Pre-determined Electronic Counter Control is the only model of this type that has been proved in service, and the first one of this kind has now been in use nearly two years.

How It Works

The Scialky Pre-determined Electronic Counter Control counts the cycles of power line frequency which is generated by the U.S. Naval Observatory. By pre-determined absolute counters, cycles and length are simply counted by a counter ratio to control the cycle of the workpiece assembly. The absolute consistency of the control eliminates the need for time-consuming periodic check-out or calibration. Plug-in feature permits easy tool replacement, or addition of other control functions if required.

Operations Performed
Plates show typical Scialky maintenance welding applications in jet engine parts: Afterburners, Seroush Screen, Engine Duct Assemblies, etc. Materials welded include Nickel Alloy, Niobium and Stainless Steel.

Indirect Bus Available

One customer outlining the success of Scialky Resistance Welding Techniques in jet engine components are available on request. Sample evaluations will be furnished on request or by outline of your requirements.

Write today, mentioning the information you would like to receive. There is no obligation. Scialky Inc., Box 1022 W. 67th St., Chicago 26, IL 60652 or 300-566-2466.



coil(s)," welder nose, preventing wire buildup.

Shuttle down, reset lag and center wire as desired by preventive leads, all without readjusting. Jet engine gages will have their own automatic controls.

Cockpit modifications include three feet for each target, added to each side of pedestal between respective engine throttles. Switch gear is added outside cockpit to control each major control panel. Group of four small instruments is added just above upper left. Control and power stability is "positively unaffected."

Vertol Acquires ARA In Stock, Cash Deal

Mt. Union, Pa.—Directors of Vertol Aircraft Corp. have approved acquisition of Alfred Research Associates Inc., of Boston, in a move to provide Alfred Research with production facilities and Vertol with expanded scientific research capabilities.

Alfred Research has been producing limited quantities of a new all-metal vibration isolator mount and a plasma centrifuge and for increasing engine efficiency. Offshore and both products hold promise for large-scale military and industrial use.

Lawrence Levy, Alfred Research president who has been elected a Vertol director, and officers with Vertol will assist Alfred Research to concentrate more intensely on basic research and prototype development, while depending upon Vertol for advanced engineering development and production. Levy said there will be no change in management.

Fasteners and tool exchange of \$710,000 is cash and 10,500 shares of Vertol stock in return for all outstanding stock of Alfred Research and an affiliated company, ARA Protection Inc. Transaction is subject to winning of competitive rights on the part of Vertol shareholders of record Feb. 6 at a special meeting March 14.

Don R. Belkin, Vertol president, said the move will broaden the company's scope of interests and for the present will be concentrated into what is well as completely new fields. Vertol has been engaged with a number of areas of nation's and commercial defense and experimental research and will continue to do so.

Alfred Research, formed six years ago, first worked under USAF contract to eliminate effects of atomic bomb blasts on aircraft structures. Job is still performed in about half of Navel and Air Force testing programs. Present contracts include work in fields of acoustics, plasma, chemistry, electronics and seismology. No financial

NEW "NO-MAG"

NON-MAGNETIC AIRCRAFT CABLES

- GOOD THERMAL CHARACTERISTICS
- CORROSION RESISTANT
- HIGH FATIGUE RESISTANCE
- HIGH ABRASION RESISTANCE
- PREFORMED CONSTRUCTION

Eliminates Instrument Interference!

• Just as we expected, came up with a new cable for aircraft applications in the recent announcement of our new non-magnetic aircraft cable. If you did not see it, "NO-MAG" has these characteristics:

NON-MAGNETIC PROPERTIES

"NO-MAG" cable is made from type 303 stainless steel. It remains non-magnetic after severe cold working—in contrast to standard stainless steel aircraft cable which shows a pronounced increase in magnetism after drawing, wirerawing or similar operations.

This means better properties of "NO-MAG" cable eliminate instrument interference from cable magnetism.

THICKNESS GROWTH

While thicker than that of standard stainless steel aircraft cables, it is sufficient to enable replacing those, size for size, with "NO-MAG" on many applications where the characteristics of "NO-MAG" are required.

USE WITH SCAFFOLD TERMINALS—Scaffold terminals can be applied to standard air dimensions.

COMPLETE RANGE OF SIZES

CONSTRUCTIONS—New "NO-MAG" is furnished in sizes from 1/16" to 1" in all of the standard aircraft cable constructions.

Get the complete story on this new technological development for the aircraft industry. Write today to Detroit office.

Automotive and Aircraft Division AMERICAN CHAIN & CABLE

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First photograph shows maintenance men carrying F-105s on final assembly line in Republic Aviation Corp.'s Farmingdale, N. Y., plant.

Republic F-105s Move Down Final Assembly Line



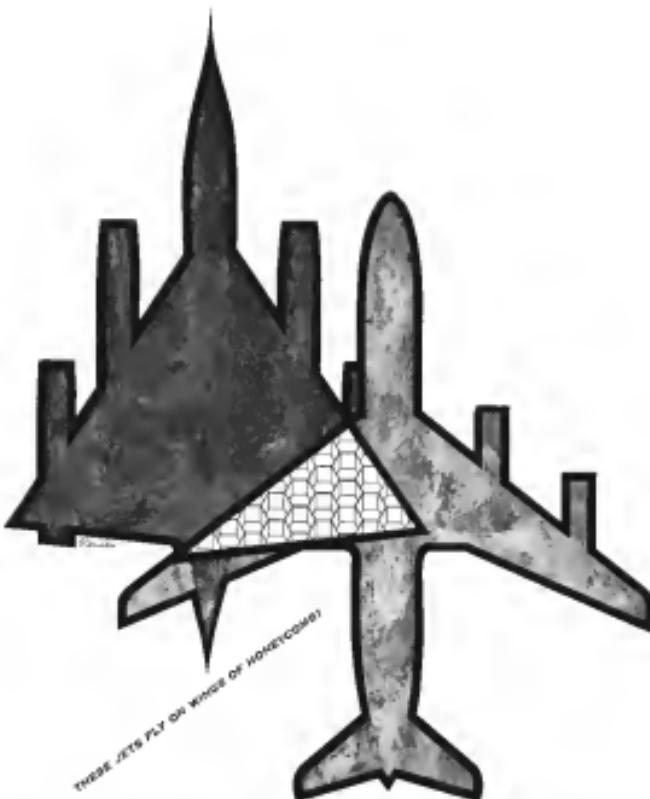
Inspector [Bill] checks installation of receiver equipment in nose of F-105 at Republic plant. Men at right are working on cockpit.



Wing gear is installed (above) in wing of a Republic F-105. The wing is suspended in a vertical jig for ease of inspection. Below, three F-105s (Households) are almost ready to leave the final assembly line in the Farmingdale plant and begin their flight tail plane. Tail sections in the foreground will house dive brakes and the afterburner sections of Pratt & Whitney J75 16,000-lb thrust turbojet engines. The F-105's circular speed brakes make up the last 36 in. of the fuselage. Aircraft is equipped with a drag chute. Accrued landing weight is 43 ft. 1 in. long; wing span is 34 ft. 11 in. Fighter-bomber has revised fin-on-tail fin for greater stability.



AVIATION WEEK, February 17, 1968



The use of Honeycomb in Supersonic military planes like the B-52 Weather is a familiar process with Convair. And when Convair's new "SAC" jet transport takes to the air in regular passenger service it, too, will fly on wings of Honeycomb—Convair's first use of this material for primary structures in commercial aircraft. Great strength, light

weight, high rigidity and remarkable resistance to structural breakdown are just a few of the reasons why more and more Honeycomb is being used by leading airplane manufacturers here and abroad.

For a world of things made lighter and stronger than ever before.

HEXCEL[®] PRODUCTS INC.
1818 NICKEL STREET, BERKELEY, CALIFORNIA



while Convair has concentrated on non-tube laboratory type instruments.

* The Singer Manufacturing Co., Blue Bell, Pa., formerly a division of the former Singer & Chase, has joined Topp Industries, Inc., Beverly Hills, Calif., which acquired the corporate last year. New organization will operate in division of Singer, maintaining its corporate identity. No change in officers or personnel is contemplated.

* American Machine & Foundry Co. will close its Boston electronics plant, assign its work to AMF's Greenwich, Conn., and Peconic, Calif., facilities. Dr. Wendell B. Sell, former general manager at Boston, becomes division vice president with headquarters in Peconic.

Texas Instruments To Build CAA Radars

Duluth-Critic Atmatron Advances major contract for an improved type of airport surveillance radar has been won by Texas Instruments Inc.

Under the \$4,491,884 contract, delivery of the new ASR-4 radars will begin in about two years for installation at 14 U. S. cities.

Texas Instruments ASR-4 will improve approach and departure traffic control by providing altitude coverage between 4,000 ft. and 20,000 ft. while in the 30° field of view. This is a gain of 4,000 ft. in altitude range over previous ASR models used by CAA.

ASR-4 will have a higher angular polarization that will enable the antenna to pick up steadily during day and more weather conditions which normally render radar difficult without the false positives problem. It also will have an improved moving target indicator that will cancel out all but moving targets on the display.

Antenna system for the new ASR-4 model will be built in a single unit solution, up to 30 ft. in height, balanced with an antenna and a half of an arc. Power source will be made to mount a 10 ft. diameter radio antenna when such equipment is available.

Continuous monitoring of power output and component monitors will be possible with ASR-4. Each set will have four Horn indicators, three for operational use and one for stand-by purposes.

Cities scheduled to get the antenna system this summer include Atlanta, N. Y., St. Louis, Ind., Akron, Ohio, Burlington, Vt., Sacramento, Calif., Charlotte, S. C., Birmingham, Mo., Boise, Idaho, Charlotte, N. C., Little Rock, Ark., Youngstown, Ohio, Rochester, N. Y., Detroit, N. Y., and DeLand, Fla.



Maintenance "down time" and costs reduced for all electron tube equipped guidance, radar, aircraft, mobile surface communications, radio-TV and other industrial and domestic types of electronic equipment!

You can get immediate, most effective results only with IERC Heat-dissipating Tube Shields—the exclusive, patented, time-proven design available in a wide selection to meet every electronic equipment requirement. In many electronic applications, IERC heat-dissipating tube shields are the only commercially available heat-dissipating tube shield which is actually most or exceed military specifications because they provide greatest reduction of aluminum tube both operating temperature, maximum vibration and shock protection plus compatibility with all tube diameter tolerances.

Investigate this proven way to get increased tube life and equipment reliability by eliminating electron tube failures commonly caused by heat, vibration and shock.



And increasing electron tube stability for miniature, hybridized, metal and power tubes.

We'll gladly send you our **IERC Heat-dissipating Tube Shield Guide** showing over 1,100 tubes and tube shield combinations to select from for increased tube life and reliability. Write today!

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NEW AVIONIC PRODUCTS

(Note. Beginning with the issue, Nov. Atomic Products has added a category called "High Temperature Components," in recognition of the steadily growing importance of these in reactors. Components listed in this section have, according to their manufacturer, been designed to operate at temperatures above 1000°.)

High Temperature Components

- *Silicon power rectifier, Type 104, a hermetically sealed, can provide forward direct current up to 12 amp. with maximum peak inverse voltage up to 900 V. Unit can operate at junction temperature of 90°F with no detectable change of characteristics due to aging. Reverse leakage is a maximum of 10 microamperes.



the at rated peak inverse voltage and maximum temperature. Case is the positive terminal with it in flooded and permitting mounting in an open

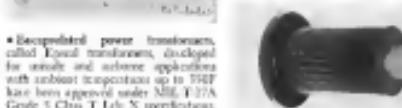
Complete bridge assemblies are also available. Westinghouse Electric Corp., Box 1899, Pittsburgh, Pa. 15236.

- Two types of rice insulation, called Cigarillo Grade Insulation and Sausage. For use in rolled or stacked exterior wall and to provide void free mass insulation in unheated areas at a fraction of the cost of imported rice hulls. Sausage is a press made short strand fiber.



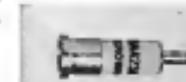
voltage and current are 25 v. and 90 mA respectively. Operating temperature range is -65 to +150°. Eleye-Panamatic Division, Bendix Aviation Corp., Teterboro, N. J.

-
- Differential transformer ammeter meter.** Model ADT-905 is equipped with self-calibrating system which can be used separately or disconnected, also can check operation of the ammeter meter while in use. Unit is said to be sufficiently stable over temperature range of -45 to +125°F. Diagnostic equipment for control and guidance is



aircraft and missiles, the unit operates at a low natural frequency of approximately 30 cps considering stable damping response characteristics over the temperature range as a result of magnetic damping. Galton Industries Inc., 212 Division Ave., Minneapolis 10.

- Silicon肖特基二极管，型号MA-413A，其正向压降在C和X级整流器的许多应用中是可接受的。与其他类型的EN23系列二极管相比，该肖特基二极管具有不同的点接触焊点，因此没有死区时间，并且能够提供改善的反向恢复特性。



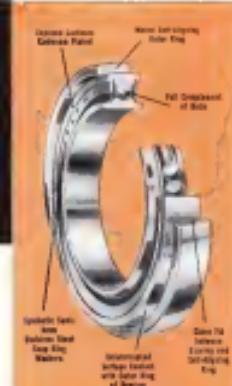
7.0 db at home when used with a 1.5 db HF strip at 10 cm. In some radio receivers employing IN21C or IN21E diodes, circuit adjustment of HF impedance match, local oscillator drive, and RF input can be necessary to obtain minimum wave figure measurement. Macintosh Associates Inc., Burlington, Mass.

- **Magnetic wave amplifier.** Type CSA-2A.1, is a three stage amplifier designed to accurately measure raster spot position of a beam phase 50 cycle deflection system, meets MIL-R-317C. Full voltage output is provided with an input of 20 millivolts d.c., corresponding to a d.c. voltage of 7 ms. Temperature range is -12 to +45°C, weight 1 lb. dimensions 6.5x7x17.5 in. Magnetic Controls Co., 6405 Cudahay St., Menomonee Falls, 16, Miss.

How to keep controls and costs "in line"?

FAFNIR
Torque Tube Type
Aircraft
Control Bearing

with Self-Aligning Outer Ring



Design, assembly, and inspection of push-pull control systems are simplified considerably when Feltie KP-B Series Tab Type Control Bearings are specified.

Developed to accommodate structural deflection, manufacturing errors, and differential expansion and contraction in high-speed aircraft, KP-35 bearings feature a self-aligning outer ring. This eliminates the need for extra parts to achieve and maintain correct bearing alignment in housings. Thus, these bearings make possible important savings in space, weight, assembly time, and cost.

An adaptation of the AN282 KPB series, Fafnir Self-Aligning Torque Tube Type Ball Bearings have the same high capacity as the rigid KPB Type. The close fit between the self-aligning ring and the bearing provides the necessary rigidity for control systems. For detailed specifications, write The Fafnir Bearing Company, New Britain, Conn.

AVAILABLE SIZES AND DIMENSIONS

Rowing Number	S	D	V	N	A	C	E	Re-Counter (Sort)	Scales		Wt App.
	Bern + 20000 - 40000	Ovrl- dust + 20000 - 40000	Wt-Bal- balance + 20000 - 40000	Weight Overs- Bal- balance + 20000 - 40000	Wt-Bal- balance + 20000 - 40000	Wt-Bal- balance + 20000 - 40000	Wt-Bal- balance + 20000 - 40000		No.	Size	
SP14905	1.0000	1.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	1.0000	004	004	1.0000
SP15005	1.1212	2.2424	-0.3737	-0.3737	-1.4366	0.0000	0.0000	2.1212	005	005	2.1212
SP15105	1.0000	0.9999	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.9999	004	004	0.9999
SP15205	1.0000	2.0000	-0.2000	-0.2000	-1.4000	0.0000	0.0000	2.0000	005	005	2.0000
SP15305	1.0000	1.7799	-0.0201	-0.0201	-1.0000	0.0000	0.0000	1.7799	004	004	1.7799
SP15405	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	004	004	0.0000
SP15505	2.1212	4.2424	-0.5737	-0.5737	-3.6366	0.0000	0.0000	3.2185	005	005	3.2185
SP15605	0.9999	1.9998	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.9998	004	004	0.9998
SP15705	1.0000	1.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	1.0000	005	005	1.0000
SP15805	1.0000	4.0000	-0.0000	-0.0000	-3.0000	0.0000	0.0000	2.0000	004	004	2.0000
SP15905	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	004	004	0.0000

John H. Binkley is a retired attorney who has lectured on environmental law at the University of Oregon.



FAFNIR AIRCRAFT BEARING

FIRST...at the turning points in aircraft design



Definitive wins of new SPS self-locking lightweight nuts not only add strength, but also ensure great weight efficiency, because the full height of the nut is usable bonding surface. All threads are locking threads.

New SPS lightweight locknuts help you reduce airframe weight without sacrificing strength

Self-locking fasteners are 49% lighter than their standard counterparts

If you are looking for ways to save weight in airframe applications, SPS's new self-locking lightweight nuts offer a solution. Designed specifically to save weight without sacrificing bonding strength, these fasteners add to the Plusline line of locking nuts savings 49% lighter than their standard counterparts.

Approved under specifications AN-N-30A and MIL-N-2907, SPS lightweight locknuts are of forged, all-metal design, forged for high strength. Threads which employ 3-point locking assure all four sides bonded. Thus, combined with savings of the nut, permits use of thinner bolts, resulting in further weight reductions.

Extensive testing of the new SPS self-locking light weight nuts under requirements of Government specification was conducted with procedures in one full hour of vibration testing (for a 11-28 cps). Results show that the overall design maintains a high degree of sealability, excellent tension-tension fatigue characteristics and superior holding power under conditions of severe vibration or temperatures up to 500° F.

For complete information, write Aircraft and Missile Division, Standard Precision Stahl Co., Andover, Mass. 01810.

R At SPS we apply a dynamic standard of quality to everything we do. That's why SPS fasteners will always have the highest reliability features available by today's fastest growing aerospace companies and government agencies. By using SPS self-locking fasteners, you can increase your aircraft's overall performance and reliability - the certainty of producible per specification under strict service conditions.

For more information, call toll-free or write our Service Department for a copy of the SPS booklet "Concerning High Reliability" — you'll be pleased.



Now SPS self-locking lightweight nuts, available in five sizes—diameters 1/4 through 1/2 in.—are custom-made per specifications QQ-P-416.

Write for free brochure.

SPS Jenkintown • Pennsylvania
Central Flyer West Co., 1000 North Main Street, Suite 100
Central Flyer East Co., 1000 North Main Street, Suite 100
Midwest Co., 1000 North Main Street, Suite 100
Southwest Co., 1000 North Main Street, Suite 100



Fishbed B Fences, Fins Indicate Airflow Problem

Soviet Russian fighter designed by Frol Salkin and made there. Development of Fishbed B was observed at the 1956 Tashkent air show. Development of Fishbed B has been discontinued; it has been superseded by the Salkin Fulop (ATF) Jet 20 + 30. Wing fences and vertical fins on Fishbed B-like aircraft of which indicate aerodynamic trouble-free have been eliminated in Fulop. Wing planform and tail arrangement on the two aircraft are nearly identical.





KC-135s on Line at Castle AFB

Crewed version of DSD's Strategic Air Command is demonstrated by these Boeing KC-135 jet tankers transports, shown on flight line at Castle AFB, Marysville, Calif. Aircraft perform cargo support role at rate of 800 tons solid with deterrent striking force. On operational units with SAC for nearly two years, the KC-135s have multi-purpose to refuel bombers in refuel fighters and bombers at high speeds and altitudes, and to transports for high priority cargoes and personnel. Civil counterpart is Boeing 707 transport seen in CAA test plane

Researchers Operate Bearings to 1,000F

Successful operation of metal bearings at temperatures approaching 1,000F without the aid of case external lubrication is reported by Shell Oil Co. research scientists. Operation of guided missiles and hypersonic aircraft in temperatures now considered extremely difficult or impossible is promised by the new lubricating method, called "passive atmosphere" lubrication. Oils and greases were used at test bearing operating temperatures to about 900F.

The project was described as a paper entitled "Passive Atmosphere for High Temperature Bearing Operation" by C. H. Baker, Stanley S. Sorenson and A. G. Cutshaw which was read by Dr. Cutshaw before an annual meeting of the Society of Automotive Engineers at Detroit. Work was done under Air Force contract at the Shell Oil Co.'s laboratories at Emeryville, Calif.

Investigation was based on the theory that there is no technological reason why roller bearings made of cast steel cannot operate satisfactorily at temperatures up to at least 1,000F. Dr. Cutshaw explained that there are many examples in industry of steel rolling successfully on cast without adding a ribbed wheel rolling on the rail.

Tests carried out on the equivalent end of a 10,000 rpm spindle with an

electronically heated bearing housing proved that mechanical details, including bearing fit, alignment and cage balance, were extremely important. Consequently, results also demonstrated a "breakout" of bearing life operation with oil lubrication below 700F.

Bearing breakdown, it was learned, was caused by iron oxide which formed during the test operation and acted as an abrasive. This problem was solved by the addition of a small amount of lubrication vapor to the air, attracting the oxygen before it could attack the bearing housing. This permitted test runs of several hours before bearing failure occurred.

When failure did occur it was the result of scaling or iron scaling, or the reduced adhesion of the scale. In conventional lubrication, scaling is prevented by use of "extreme pressure" lubricants which allow steel to provide a lubricating surface. It was found that if such additives were used during the heating process and were then added in vapor form with the iron oxide vapor, a lubricating film developed on the rubbing surfaces of the cage and rolling elements. This method has been used to operate bearings for 100 hr at temperatures approaching 1,000F without any evidence of bearing failure.

Research workers at the Titanium Metals Corp. of America developed a technique utilizing the titanium bath vacuum fusion method of oxygen debridement for application in the jet engine industry.

The oxygen content eventually of the bearing parts after fusion operation, measures 100 ppm, which would not fail had had been found previously useful in providing the protective, ceramic glaze used on the test. The fact was

found to contain certain areas which contains what "extreme pressure" adds to the iron oxide layer of lubrication film on the bearing surfaces.

Shift in continuing the research to

"passive atmosphere" lubrication at Emeryville with emphasis on defining optimum combination of materials and mechanical configurations for use with the new method.

Technique Controls Titanium's Oxygen

Desert control of oxygen content in the manufacture of titanium alloys is an achievement of titanium alloy researchers at the Lockheed Missiles and Space Co. laboratory at Sunnyvale, Calif., which may lead to improved methods of producing titanium and its alloys.

Control of oxygen content in titanium alloys, up to have advanced by its direct removal such as hydrogen flame and vacuum distillation, demonstrates it is feasible to produce titanium and its alloys with added oxygen content and reproducible mechanical properties and lubricious characteristics are to be obtained.

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The oxygen content eventually of the bearing parts after fusion operation, measures 100 ppm, which would not fail had been found previously useful in providing the protective, ceramic glaze used on the test. The fact was



Breguet Modifies Tarn

Breguet's first Tarn lightweight fighter displays modifications based on results of flight testing. Trickle down, partly open part behind engine. Initiates engine operation at low speeds. Air intakes covered on left, were moved forward. Wings generators dot the tailplane at the horizontal stabilizer. Second prototype, the Tarn 1000, has flown and third prototype, the Tarn 1000, is under construction.

Reports Available

The following reports were sponsored by the Office of Technical Services, United States Department of Commerce, Washington 25, D. C.

Standard Steel and Titanium Standard Structures—By W. J. Lewis, G. E. Thielke and P. J. Reppel, Titanium Metalurgical Laboratory, Battelle Memorial Institute for Office of Technical Services.

of Defense for Research and Development, August, 1957 \$1.30. 39 pp. (TB 121635)

The Physical Properties of Titanium and Titanium Alloys—By W. J. Lee, L. Sonda and J. W. Hallinan, Titanium Metallurgical Laboratory, Battelle Memorial Institute for Office of Technical Services.

37 pp. (TB 121629)



WHAT'S NEW

Publications Received

Space Flight and Satellite Vehicles—By R. B. Root & A. C. Rothfuss—Pub: Petersen Publishing Corp., 2 West 45th Street, New York, N. Y. \$3.95. 139 pp.

A series of developments and an assessment of present developments in atmospheric flight.

S-62's Hull Near Completion

Flying boat hull of the Sikorsky S-62 seaplane will be passed into final stages of construction, just prior to being converted to float configuration. First flight of the S-62 (AW Dec. 30, p. 25) is slated for May.



Alcoa crashes the heat barrier

Alcoa Aluminum Powder

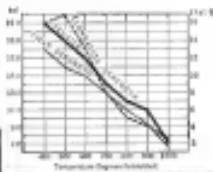
Metallurgy Products withstand temperatures up to 900°F; open up NEW weight and cost savings

The new Alcoa[®] Aluminum Powder Metallurgy Products (APMP) open a whole new area of special applications for aluminum parts in aircraft design. Already in regular commercial production, they retain their mechanical properties even at temperatures 400° F above the thermal breaking point of conventional aluminum alloys. This means that lightweight, low-cost aluminum can now be used in hundreds of applications where extremely high temperatures conditions, under moderate loading, are encountered. They are ideal for challenging applications, for example:

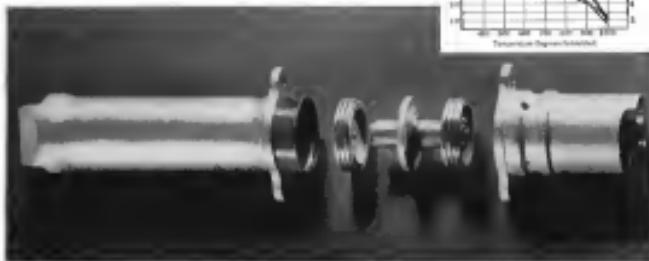
Years of investigation and testing by Alcoa Research Laboratories led to the development of these fine size-sifted aluminum powders, resulting

in processing with aluminum oxide to give them their remarkable heat resistance. Strength and stability are added by forming the powder into "compact" through subjecting it to extreme heat and pressure.

Find out how Alcoa's amazing new APMP alloys can design savings and lighter weight into your products. Call your local Alcoa sales engineer. Aluminum Company of America, 1800-B Alcoa Building, Pittsburgh 15, Pa.



You can design the benefits of



Already in use, Alcoa's new APMP alloy M327 is giving dependable service at Pratt & Whitney Aircraft's JT5 at ratings the parts shown in this exploded view were made of Alcoa's APMP alloy M327 and were fabricated by Ex-Cel Corporation. The JT5 is the first aircraft engine to use APMP at temperatures ranging from 400 to 900°F. Insert chart showing tensile and yield strength and elongation of Alcoa APMP alloy M327 at various temperatures.

Your Guide To The Best
in Aluminum Valves



"ALCOA TREBLE" Soaring Motives, Alcoa Works Growing

NEW AVIATION PRODUCTS



Cooling Effect Detection, Electrical

Cooling effect detection and control system costs aircraft and missile equipment by means of heat and refrigeration air. Advantage claimed by the manufacturer are reduced engine power needed for refrigerating turbine, actuator to hold air temperature and airflow, and maintains constant cooling effect. System consists of a cooling effect detector, a magnetic amplifier controlled assembly, and a warning system to activate solenoid assembly. Solenoid holds cooling effect below critical minimum temperature with a range of plus or minus 10° F of either value.

Bartec Co., Inc., Rockville, Md.

heat, the unit is said to be valuable in combating ignition and radiation fires.

Tank capacity is 1,000 lb of dry chemicals. Tanks which are at the top when the equipment is idle, preventing the dry chemicals from clogging the outlet. In use, the sphere is automatically returned to working position. Pressure for chemicals is compressed nitrogen. Dry chemicals are heated by



Landing Gear Actuator

Landing gear uplock actuator for emergencies, use in the event of failure of the hydraulics or pneumatic systems or in case of fire damage to normal cylinder. Model 149 is designed for both military and commercial use. Characteristics are: weight, 8.77 lb; envelope dimensions, 7.5 in. x 3 in. x 1 in.; drive voltage, 12 to 16 v.; driving moment, 10 atm.; time to 1,000 pounds, 10 milliseconds; gas pressure and volume output to specification. Unit may be activated electrically or mechanically.

Plow Bros. Inc., 411 West Second, Odessa, Texas.

Propex Chemical Corp., P. O. Box 187, Edwardsville, Ill.

Missile Synchrons

Six 11 inchers are designed specifically to withstand the severe environment associated with missile applications. Synchrons are claimed to perform under four major environmental conditions: corrosion, high temperature, vibration and shock. Housing shells and



bearings are stainless steel. Synchrons are sensitive to within 10 deg of alignment zero over temp range of -50°C to +200°C. They are said to operate without performance after shocks of 50G and without load 20G over a vibration spectrum of 20 to 2,000 cps.

Krofitt Co., Inc., Little Falls, N. J.

Dry Chemical Extinguisher

Potable breathing gear utilizing dry chemicals is claimed by the maker to be the first successful application of dry chemical for the control of smoke fires. Originally designed for major oilfield

DESIGN ENGINEERS

For mechanical, structural, or electrical design on airplanes or missiles.

ALSO NEEDED ARE:

Systems Engineers
Sr. Aerodynamics
Sr. Flight Test Engineers

Structural Engineers
Stress Analysis
Sr. Test Engineers

Engineers experienced in one or more of the above fields are invited to write to:

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MCDONNELL

Aircraft Corporation

EDISON 2-348

LOCKHEED ELECTRA...

*the only practical,
economically sound
air transportation
machine for "short-to-medium haul" air-
line routes!*



"SHORT-TO-MEDIUM HAUL"—WHAT IS IT?

Route patterns divide into "long-haul," "medium-haul" and "short-haul"—each with different characteristics... each requiring a specialized air transport to fit its needs. Short and long-haul characteristics and the kind of machine needed are most clearly defined. Medium-haul is between the two, and is less clearly definable.

ROUTE DEFINITION

(1) **LONG-HAUL**... a pattern of long, non-stop flights between big cities with big airports—generating heavy traffic.



(2) **SHORT-TO-MEDIUM HAUL**... involves a varied pattern with many intermediate stops—with lower flying altitude for shorter periods—and between large, medium and small cities... some with small airports and with traffic varying from very heavy to very thin.

Since 35% to 65% of air traffic travels on "short-to-medium" haul routes, profit or loss on this portion of the system determines airline financial success.

TRANSPORT REQUIREMENT

(1) Requires the large turbo-jet powered airplane, flying at high cruise speeds and high altitudes for long periods.

(2) Requires a highly specialized, flexible machine of just the right size and carefully tailored to fit "short-to-medium" haul needs. Emphasis must be on economics since airline unit operating costs are inherently higher in this area.

LOCKHEED ELECTRA...

The Electra is the only practical air transport in the market or under development, explicitly designed from the very start to fit the unique operational needs of "short-to-medium haul." It was designed and produced by the greatest team in aviation history.

Aircraft... by Lockheed
Power... by General Motors (Allison)
Airline functional counsel by:

American Airlines
Eastern
(among the largest, most profitable
airlines in the world in "short-to-
medium haul" field.)

Sponsoring by:
Air France of Mexico
American Airlines
Ansett / ANA of Australia
Braniff Airways
Cathay-Pacific Airways
Eastern Air Lines
Garuda Indonesian Airways
KLM Royal Dutch Airlines
National Airlines
PAA—Pacific Southwest Airlines
Western Air Lines

(Total of 144 Electras on order—
for over \$300,000,000)

THIS OUTSTANDING TEAM, by employing the most advanced aircraft and turbine power technology, in the proper realization for the required job in the turbine age, developed and produced the Electra.

RESULTS THAT SOLVE THE SHORT-TO-MEDIUM HAUL PROBLEM FOR TODAY AND TOMORROW

Economical

Profitability under today's and tomorrow's operating conditions
NO UNKNOWN'S!

Dependable Passenger Appeal

Quiet, vibration free. Shortest elapsed trip time and most frequent schedules with all weather dependability.
NOT JUST NOVELTY APPEAL!

Practical Operational Performance

For "many-stop" schedules under today's air traffic control conditions.
NO UNPLEASANT SURPRISES!

Realistically Achievable

Highest utilization, shortest ground time with practical load factors on "stop-stop" schedules.
THE TOOL FITTED TO THE JOB!

LOCKHEED AIRCRAFT CORPORATION

Burbank, California

BUSINESS FLYING



HELICOPTER lifts heavy hoisting unit out by roof of new Afco missile plant building over under construction at San Diego, Calif.

S-58 Transfers 103 Tons in Six Hours

San Diego—A single Sikorsky S-58 helicopter recently operated more than 100 tons of hoisting and ventilating equipment on the 11-acre roof of a missile plant being built here for the Aerospace Division of General Dynamics Corp.

Lifting job, which required about 70 quarter-mile flights, was accomplished in six hours. A representative of Sikorsky Aircraft Division of United Aircraft Corp. described the task as the

biggest ever performed on a plant roof structure project.

Afco was conducted by Roto-Air, Inc., of Vernon, Calif., operator of a fleet of 30 helicopters in California, Alaska and the Gulf of Mexico. Operator guaranteed to position the units to a tolerance of less than one inch.

Equipment was lifted to the roof of General's new Afco missile factory building, one of six major buildings near Montgomery Airfield which, along with eight smaller ones, will cost \$10,000,000. Work was done for Bevier & Caud Contractors Co., Pasadena, Calif., the hoisting and platforming sub-contractor under McNeil Construction Co., Los Angeles.

Joe C. Russell, Bevier & Caud San Diego manager, said use of census to hoist the 18 hoisting and 18 ventilating units would have necessitated good reinforcement with heavy girders at higher heights and greater weight. Gross gross weight, which included 22 tons

of pipe, was 256,500 lb.

Afco officials said it consisted of light metal, converted for parking up cargo stacked on a parking lot, carrying it to the factory and lowering it while a crew of riggers hand-jockeyed the units into place precisely.

Lifting units weighed 3,400 lb each and consisted of heavy-duty lift safety lever (175,000 lb strg), electric motor and fan, all mounted on steel base. Units were packed in a sheet metal housing.

Russell said use of the helicopter "saved thousands of dollars and about four weeks time." Lifting job, according to H. K. Bevier, San Pedro, Calif., representative, will find wide use of this technique in connection with building construction. He termed job "ridiculously simple" in comparison with helicopter work performed by petroleum companies in the Calif.



SPOTTER in doorway checks helicopter pilot as disengaging main rotor



H-58 comes down on route to speed trials flight. Unit weight 1,490 lb.



ARNAUT for Convair Aerospace Division plant was described as largest done yet on a construction job. Gross weight was 186,800 lb.



Barden Precision 30 B-10 miniature bearings are used in a Differential gear train

Specify **BARDEN** Precision miniature ball bearings



Precision-built computer gear trains must have uniformly low torque and maximum load capacity, requiring surfaces for the bearings should be simple to manufacture.

Barden Precision miniature-ball bearings have the required low torque. Their low eccentricity and close controlled radial play insure uniform health. Precision ball bearings provide accurate positioning surfaces and permit through-boring, eliminating the need for housing shoulders.

Barden Precision miniature bearings are built to the same high standards of consistent quality as Barden's larger instrument items.

Barden Precision means not only dimensional accuracy but performance to match the demands of the application.

Today's precision needs Barden Precision if it has critical requirements for accuracy, torque, vibration, temperature, or high speed. For less difficult applications, the predictable performance of Barden Precision bearings can ease your rejection rate and slowdown costs.

Write today for your copy of Catalog Supplement 100 which gives dimensions, performance and separation data on Barden Precision ball bearings 1/8" O.D. and smaller.

THE BARDEN CORPORATION

41 E. Franklin St., Danbury, Connecticut • Western office: 3150 Wilshire Blvd., Los Angeles 3, California

Czechs Manufacture 3-Seat Utility Plane

Czechoslovakia's Avia factory has just recently developed three-place utility aircraft into quantity production.

All metal, tail-wing, monoplane, equipped with a 200 hp air cooled Prague-Dem 37 engine, it is intended for agricultural, photographic, surveying, linear and glider-towing work. Rear section of the nuclear engine spans a speed to prevent leading fragmentation of wings.

Flight is of steel monoplane construction. Wing is braced to the fuselage on V-shaped struts. Trailing edge flaps and leading edge slats are electrically operated. Motors are plotted. Radio and electrical equipment is standard.

Spanwise area is 39 ft. 2 in. height 9 ft. 6 in. wing span 44 ft. 8 in. and 264 sq. ft. leading gear track 9 ft. 6 in. wing loading 11.52 lbs per sq. ft.

Empty weight is 1,537 lbs., gross weight 3,014 lbs., maximum speed 118 mph., maximum speed 12.7 mph., climb 6.16 ft per sec., takeoff distance over 50 ft. shelter 515 ft., landing distance over 20 ft. altitude is +53 ft., range is 417 mi.

Civil Plane Exports Climb 17% in 1957

Exports of U.S. built business and utility aircraft, totaling 6,000 in 1956, increased 17.1% during 1957, with sales valued at \$13,372,573, an increase of 17.9% in worth and 40% in dollar value since 1956. Five firms—Avia Doprava & Tovary, Letecky, Czechoslovakia, and Tatra reported these totals.

Detailed breakdown of 1957 shipments shows: South Korea (percentage), Afghanistan (1), Algeria (5), Argentina (10), Australia (16%), Austria (1), Belgian Congo (1), Belgium (5), Bolivia (1), Bulgaria (1), Brazil (1), Chile (1), Costa Rica (1), Czechoslovakia (1), Denmark (1), Ecuador (1), Egypt (1), France (1), French Equatorial Africa (1), Greece (1), Greece (1), Guatemala (7), Honduras (1), India (1), Indonesia (1), Iran (7), Iraq (5), Ireland (1), Israel (1), Japan (1), Japan (1), Laos (1), Liberia (1), Libya (1), Madagascar (2), Mexico (1), Morocco (1), Netherlands (1), New Zealand (1), Norway (1), Pakistan (1), Portugal (1), Singapore (1), Peru (1), Philippines (1), Portugal (1), Portugal East Africa (1), Sweden (1), Switzerland (1), Thailand (1), United States (1), Uruguay (1), Venezuela (1).

Also, Alco, Alaska accounted for 17 units and Puerto Rico for one.

**one thousand
hours
of contortion
and PDM coding with CEC's
NEW PLEXICODER**



The revolutionary Type 40-001 PLEXICODER generates signals from up to 90 transducers at 112.5 samples per second and converts them into discrete-coded pulses suitable for telecorder or magnetic tape recording.

The PLEXICODER is a solid-state, completely passive or resistive, low-level signal generator probe and thermocouples.

Generators (with enhanced filtering characteristics) and an option system replace existing super-strict assemblies and complex electronic machinery. Operating model can be charged easily with battery pack.

On-off system accuracy is 1%. Maintenance in the field is accomplished without tools in the factory—service-free life is a measured 1000 hours. The PLEXICODER weighs 4.8 lbs., measures 25" high by 8" in diameter.

Designed for the most exacting applications, it records rockets, or missile warheads, ideal for engine test stands, telemeasuring systems, and ground-based data-handling systems. Call your nearest CEC sales and service office, or write for Bulletin 1999-X1.

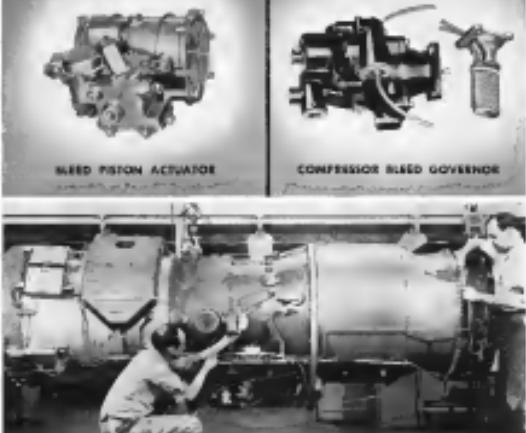
Transducer Division

**Consolidated
Electrodynamics**

300 North Zeeb Drive • Hillside, California
RECOGNIZED LEADER IN ELECTRODYNAMICS • TELEMETRY

PRESSURE AND POSITION INSTRUMENTATION

Holley engine controls selected for JT4 engines on America's first jet airliner



Powered by four JT4 Pratt & Whitney Aircraft engines, the Boeing 707-320 will carry 131 first class passengers from New York non-stop to the Continent in just over six hours. Each of these new engines, commercial counterparts to the J-75 which drives many of America's first jet fighters, delivers up to 15,000 pounds of thrust. Ability to pack so much added power into a relatively small space is the result of designing engine components which will operate at higher efficiency, require less area and reduce over-all weight.

Holley Carburetor Company, work-

ing closely with Pratt & Whitney Aircraft engineers, carried out this exacting assignment on such vital engine components as the compressor bleed governor, and the bleed

governor actuator. For single and auto-engine military aircraft, the Holley auto fuel control is a separate unit to the Holley governor and actuator.



1105 E. Nine Mile Road • Warren, Michigan
Division of the Engine, Environment and Metal
Services of Reliance Fuel Marketing Division

For military applications, the Holley auto fuel control boasts a unique link to the governor and actuator.

PRIVATE LINES

Production of two Piper Comanche aircraft business planes (AW Nov. 10, p. 100) is continuing, says company, which had 26 Comanches in January, is holding 33 for next month.

Cessna has been awarded an additional contract for 10 L-38A light twin (Model 310) to the Air Force totaling more than \$1.5 million. Deliveries under this contract begin in May. Award follows receipt of an additional contract for another T-38A, twin jet trainer totaling more than \$10 million, extending production on the airplane well into 1959.

Management, sales, advertising, publicity and promotional techniques implemented by the Cessna Corporation in its operator's business at home, offered by National Aviation School Schools Memphis, Tenn. Operators plan to develop an annual convention featuring panel discussions of interest to school operators.

Approximately \$3.5 million worth of quota for T-34 Mentor trainers have been ordered from Beech by the Navy. Beech contracts that aim at space and other support steps for its warbirds and civil aircraft will exceed \$10 million during Fiscal 1958.

"Admiralty of Aircraft to Canada" is producing 100 propeller racing-aircraft models suitable for private and business pilot planners to issue the book. Provided are flight plate requirements, landing and departure formations, air navigation aids listing, and list of all airports and customs offices. A reference map shows areas for which air navigation charts are available. Write: Canadian Government, Travel Bureau, Ottawa, Canada. Booklet is gratis.

Loring and Gossen Bravetta Manifolds (BMW), Treibwagen-Gesell., Munich, Altbay, has signed agreement under which BMW will produce Loring CG400 piston engine and landing gear and serve of the U.S. postwar surplus and in Germany.

Letter contract covering \$100,000 in military aircraft maintenance has been issued by the Army Engineering & Maintenance Co., Duluth, Calif., from USAF. Contract covers modifications of a Douglas MATS transport aircraft C-126 Globemaster, w/ engine. In all, 200 additional transports during the next six months. Army will handle project in a new hangar under lease. Firm already accepted processing of 5,336 USAF T-33A jet trainers.



Comeback for Culver Lightplane

Modernized version of biplane Culver lightplane, in production by Superior Aircraft Co., Culver City, Calif., is shown undergoing flight test on West Coast. Powered by 95-hp Continental, the new 310B, as it has been renamed by Superior, shows a 16-degree nose-over angle of 790 lb. Useful load is rated at 572 lb. Construction is wood, with reinforced plastic outer skin. Superior reports that 100 G-45 Skyline and 100 G-45B are now in production. Basic price: \$8,750. Previous largest order received review in 1966 orders. Among features of Culver lightplane are numerous flap and stabilizer pavilions for fast adjustment when flaps are lowered.

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Herb Munzer, Director, Manager Arms & Thermodynamics Department, second from left, discusses heating of protected surfaces with (left to right) R. L. Brundt, R. L. Nelson, E. W. Marsh, J. F. Galbreath (back in corner).

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Four-Engine Goose Starts Tests

Suit extension, propelling nose for radio, retractable wingtip fairing, large picture windows and enlarged doors for use economy of new McKinnon Goose business cockpit.

Rough field landing, with which exploding auto motor, is made by long-range Goose during its first program take-off, increasing 2,000 ft. long and 100 ft. wide.



Takeoff after 600-ft. run is made at 11,000-lb. gross weight during first, during which plane climbed in 2,100 ft.-per. It goes mileage from who at this weight to 39.12 mc. Initial test data shows that at 13,000 ft., McKinnon Goose does 215 mph at 65% power of its Lycoming supercharged engine, leaving weight limit cuts 15 mph. Strength passenger Goose can be converted using McKinnon developed kit rating \$125,000-\$130,000. Empty weight is 8,100 lb., gross is 12,000 lb.



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4

3

2

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New Viscount Version Cuts Refueling Time

London—New versions of the Viscount airliner, specially developed for flight service operations, will be capable of a series of one live short refueling stops of less than 100 cm at intermediate points en route to distant destinations to Victoria, Australia.

The manufacturer recently released details of the new plane, described by Aviation Week Oct. 14, p. 47.

Structural changes include a single-signal center board and a reinforced wing to assist smooth low altitude cruising conditions of 300 mph at 10,000 ft. Engines are to be Rolls Royce Dart 506, claimed as preferable to later and more powerful versions.

Delays of the local service Viscount are slated for mid 1959 and the company reports that the specification is already "being closely studied" as the U.S.

The new edition latest provides for 65 passengers in a 10-deck arrangement with five aircraft seating, six walk-throughs. The revised cabin trim has deciphered for the 500 and 510 series Viscounts. Axle width is 16 ft. Accommodation for 54 passengers is provided in a "staggered" version which seats four abreast.

A two-case layout is featured in the flight deck with a superstructure seat, and a forward seatable bench has the hydraulically operated folding starboard steps, indicator and pilot equipment.

Because of the lower cruising altitude the cabin pressure differential drops from 6.5 psi. to 4.5 psi. giving sea level conditions at 39,000 ft., and 7,000 ft. conditions at 20,000 ft.

Reduced pressurization loads on the fuselage are due to the component's compact nature, for the standard case of pressurization requires increased above-atmospheric original design life.

At normal speeds the No. 4 engine will be kept running to provide power for engine restart. But increased internal battery capacity is provided should there be a requirement to restart all engines. Windshield of propellers on Nos. 1, 2 and 3 engines is governed by tanking. Maximum takeoff weight is 61,500 lb., maximum payload 13,670 lb.

In offering a "proven" aircraft, engineers and contractors, operational background is now a critical factor. The company also points to a worldwide after-service service, including a vice-president of engineering and technical advisor of Washington, which should enable the aircraft to go straight into an low-service. "Economics of long-service operations," the company suggests, will not permit an extensive debugging period when a new aircraft enters service."



LOWER cost and weight and a background of fast avionics type experience were points in favor of installing early versions of the Rolls-Royce Dart series engine in a new long range version of the Vickers Viscount shown, present above. Engine rating is 1,510 shp. Length of aircraft is 61 ft. 10 in., span is 9 ft. 11 in. Fully loaded range is 800 mi.



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CAB Accident Investigation Report:

Passenger Blamed for In-Flight Explosion

About 0137Z July 25, 1957, an explosion occurred at the battery of Winton Air Line Flight 34 during flight near Dugger, Calif. The fire erupted from the fuselage shell and continuing to burn the pressurized cabin engulfed the cockpit. A passenger, apparently aware no smoke was flowing out through the opening, The aircraft, a Convair 440-2, N44041, was landed without

definitely at George AFB, Victorville, Calif. There was no signout to other occupants.

HISTORY OF THE PLANE

A regular crew change had been made at Salt Lake City, and Capt. Milton E. Monk, First Officer, both M. C., along with Second Officer James H. Bailey, taking the flight to Los Angeles. The flight departed Salt Lake City as scheduled, landed at Cedar City and arrived at Las Vegas at 8:21 A.M. It was about half way through the flight when weight at the rear, from Las Vegas, including fuel, passengers and baggage, was 17,300 lbs. well under the allowable weight of 40,900 lbs., the load was properly distributed.

On board were 12 adult passengers and

While the flight was being prepared for departure from Las Vegas, the crew obtained an air traffic control clearance from Air Route Traffic Control. Flight 19 was cleared, en route to Los Angeles via Victor Airway 21 to Fontana, Calif., and thence direct to Los Angeles, en route via runway 12/30. Visual flight rules conditions prevail at Las Vegas at 0215, the time of

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About 6122, subsequent clearance was requested on the company radar at Los Angeles, for the flight to descend to road altitude 10,000 ft., and to contact Los Angeles Air Route Traffic Control on 120.3 mcs over the Artesia intersection. At 0524 the flight reported in range, altitude 10,000 ft., and descended to 10,000 ft. in one minute at 300 rpm. At 0525 flight was cleared above Diamond at 10,000 ft., and for climb, indicated. Continued at 0547 and

Los Angeles at 1045. Soon after the transponder was activated there was a loud noise from the air of the aircraft. Harvard inspection by the crew members revealed extensive damage at the vicinity of the brazier and a large opening in the fuselage shell in that area. A check showed one passenger missing.

Radio contact was established at 0000 with George AFB, about 37 mi. away, as emergency weather delayed and a clearance was required for a landing there.

INVESTIGATION

Investigation disclosed that Mr. Bechtel had filing next to 94, which was one removed from the rest of the cabin on the left. He sat directly across from his neighbor.

INVESTIGATION

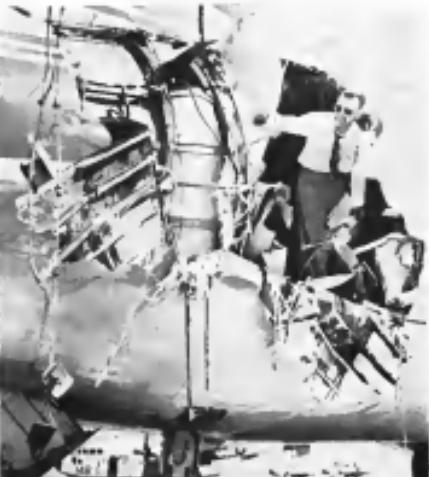
Investigation disclosed that Mr. Bechtel had taken out 9 A. which was stored from the rear of the cabin on the left. He cut down and to the outside.

should have another male adult passenger also along.

ing the steamer, long prompted by
most chaly appearance; and the fact
that the air was slightly purgative. He thought
the passengers might have landed
and been buried in the laboratory. How-
ever, he did not enter the steamer, and
Bartleby remained in the laboratory, and
in this place where the explosion occurred,
for 20 minutes after he left his boat.

and 20 miles west of the city of Las Vegas. Mr. Bristow and his wife were at a gas station on the side road. Mr. Bristow stated that shortly after takeoff from Vegas they observed three passengers at a room from them and that these did appear to be anything unusual in appearance except that all of a sudden "an automobile prepared to land on our shoulder" and walked toward the rear of the airplane. The passengers actually saw Mr. Bristow in the lavatory but they stand they were above him did not remain in his seat. Evidence showed that they were making frequent flights.

ski Hollong, the snowless, stable



PASSENGER was missing after a flight explosive Master Rule in history of this Western Air Lines Convair 940. CAB investigates found evidence of dynamite.



Tradewind Hits Rock Breakwater

Copied by a propeller accident 101 mi. off California coast, the Navy R/T Tradewind flying boat landed in a lagoon abutting Alameda Cikt. Naval Air Station, striking a rock breakwater. Emergency survivors when two motors cutting propellers on No. 2 engine broke away and tore through fuselage at 21,000 ft. Plane was further damaged when pitch control failed on one engine during landing. Despite soaking, plane still ran over 5 hr. 54 min speed record from Hawaii to San Francisco. There were no injuries.



Not only a second while before the explosion she had checked passenger seat belts and all were secured. Most of the passengers were sleeping or quiet. The stewardess further stated that after accomplishing other routine duties she sat down in her 19 D which was located in the rear end of the cabin. She was next to the steward. She also had her seat belt fastened and was there only a moment when the explosion occurred.

The stewardess was unable to see the damage at first. She said, "I looked up and out front I heard a boom like a bomb. A terrible gash of air went through cabin. I fell a pack bag and an oxygen bottle. I put my hand to my head in an instant and was half upright." Her hair was

gone and top hair was flying in my face. I was scared, shocked. I thought this was it, was it a minute. I knew there was a hole behind me, but I was not aware of where. The window on my right was shattered.

Shortly thereafter Miss Blodgett and the passengers around the rear of the cabin were forced forward.

The stewardess further stated that despite the suddenness of the explosion no one panicked. She immediately gave the passengers oxygenency instructions and again mentioned that all passengers had belts fastened.

A quick count of the passengers durant

there was 21 plus one infant ahead, one passenger was missing.

Most, if not all, of the remaining passengers were rendered by the explosion. All were substantially in agreement that there was a "blow out." One passenger in a rear seat said that following the initial blast there was a tremendous burst of air in the cabin, "explosion like a volume," he followed by more like pieces of the plane flying off.

Capt. Stark stated that in the O/TIC press report was Dugger's he informed the captain that the north end side seat in 19 L, exact location of the working propeller. Passengers had been able to sit down and neither was injured, except

that it was worn. He saw them grow the Los Angeles warbler.

He was immediately thereafter. But the land report from the rear of the seaplane occurred. At that moment the first officer was flying the seaplane and he stated he had the impression that the engine was the engine that was damaged like most, but had back track of a double headed engine behind her head. He said he noticed an hour at this time and first the engine flew normally following the blow while he set at the controls.

Captain's Action

The captain and the quickly assumed the emergency panel and determined that the exact altitude was 10,000 ft (7,300 ft above the ground) cabin pressure was at an altitude of 6,000 ft (approximately 7.1 lbs/in²). Outside temperature was +11°C, and the indicated airspeed was 175 mph. The emergency panel was then activated, and the search continued to greater areas. Capt. Stark lettered and the weather by far the first officer sonned an indication of cabin pressure rise or fall not prior to decompression.

A quick inspection of the cabin by Capt. light revealed a hole in the rear left side of engine, just forward of the right rear engine and just off of rear seat 16 D (where the stewardess was sitting) and growth in the area where the hole was located. The hole, capable to have been where he stood at the time, was approximately 2 in. by 2 in. The crew, Capt. Fredrickson in the cockpit, called the emergency plane personnel described the damage visible to him and stated he was making an emergency landing at George AFB about complete emergency facilities were available. The aircraft apparently was heading on the 111 bearing, accompanied, according to the incident.

Following the landing, the passengers were able to deplane by use of the interior stairs at the rear of the cabin. An entire row of passengers and one occupant of the plane sat at the rear of the cabin. The man in question was Mr. Berwick. Further investigation conducted him to be Mr. Fred E. Berwick, age 62, of North Hollywood, Calif.

Passenger's Body Found

From the action of the investigation it was evident that the cockpit was cut off to a maximum or increased failure of the aircraft or its components, or any action in lack of sense by the crew. However, in order to make certain that this definitely was the case a detailed examination of the damage to the aircraft was made by Capt. Fredrickson. A quick look along the right path resulted in the memory of seeing a large, dark object situated at coming from N.W.H. The body of Mr. Berwick, the missing passenger who also was found. This body showed in addition to pronounced effects of the fall a number of injuries of the head and neck, particularly the neck, causing Mr. Berwick's seat in the rear of the left arm and lower chin and part thereof in front of the explosion of a blinding eye.

A wreckage distribution chart was prepared during the investigation. It plots the approximate geographical locations of the



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object, leaving 8 ft. 6 in. the aircraft and the location of the body which corresponded to the position of the right side of the fuselage, we conclude. The direction of these various stems was approximately three and one-half or the direction of flight and about one-half mile to the south.

The area of the opening in the fuselage shell is about 40 sq. ft. The remaining materials were recovered and weighed by 6.1 kg. It was clearly indicated that there had been an explosion with an force centered on the fuselage shell which caused along the outer wall of the fuselage. This conclusion was immediately obvious following a general examination of parts and an initial review of existing literature. The first and most significant of parts showed conclusions that the evidence of the explosion occurred at all distances from the fuselage shell. There were there any evidence of metal fatigue.

Dynamite Explosion

Chemical analysis of sample found no damaged parts disclosed that the explosion was dynamic as determined previously. In certain indications of dynamite which were present in the residue.

In the cabin lining near the explosion site a faint smell of copper. At the time of the accident it was observed a portion of a blasting cap because of its small size of chemical composition was consistent with that of the shell of a blasting cap. An unexploded blasting cap was found in the storage locker together with a number of unused paper matches and pieces of burned paper.

Investigation revealed that Mr. Bentzick planned to use a lead and blasting caps several weeks before the accident.

Mr. Bentzick arrived at Las Vegas on 20 May 1965 and remained until 24 May. He then flew north to San Francisco, California, via Las Vegas Flight 14. A through air reservation of his serviceable seat in Las Vegas revealed that they were not assigned. He had dinner at a hotel and returned to the airport at 0445.

No Reservation

Upon arrival at the airport Mr. Bentzick presented his gate pass and ticket to the agent at the Western Air Lines counter. The gate pass indicated flight 14 out of Burbank on the 24th. The same Bentzick was on the ticket stubs of a few agents the agency counter and terminal. The ticket stubs that are reservations had been made out for Mr. Bentzick as he had been for his last name because the first name is sometimes listed as middle initial of the last name. To that request Mr. Bentzick made a reasonable response and agreed. He then proceeded to the Flight 14 gate and walked to Los Angeles International Airport and did not map of Burbank where he had originally started his trip. Mr. Bentzick and his wife were at the airport in Burbank and further volunteered the information that he had a seat to get there. He took no luggage and had a small bag. After the conversation Mr. Bentzick set about to secure the passenger tickets for themselves, two tickets out the flight 14.

The evidence it concludes that the time test damage which occurred about flight

12:00 hours the initial, or bigger, C.R.L. was due to a metal cable explosive on the fuselage. The physical evidence showed that the cable explosive had been cut at some point (i.e., the system had been cut) and left a residue that indicates it prior to its unexploded components of dynamite had been cut or the finding of a copper fragment in the outer evidence similar to the material of an unexploded blasting cap that can be found in the metal receptacle.

It is clear that Passager Bentzick had previously prepared dynamite and had evidence with a less powerful charge by fire this section. It is also clear that the detonation of dynamite caused a secondary explosion. Passager Bentzick was in the fuselage and his left hand was in close proximity to the dynamite at the time of detonation. The fact that burned matches and paper were found in the left receptacle makes it evident that there had been previous attempts to detonate the dynamite by fire. The evidence is sufficient to conclude that Passager Bentzick had prepared dynamite and detonated it.

FINDINGS

On the basis of all available evidence the Board finds that:

1. The cause of the aircraft and the engine was an explosion.

2. Passager Bentzick set off the booster shell after he had secured himself after the explosion occurred.

3. His fire-bent match and paper applied to a blasting cap was the method used for igniting the booster shell.

4. But dynamite set off for blasting caps had been prepared before flight by Passager Bentzick.

5. The explosion ruptured the fuselage shell.

6. Detonating set from the pressurized cabin gas tank ignited the vapors and Passager Bentzick was blown out through the hole.

7. The rapidly removed cabin ratings were lost and he died uneventfully at a nearby Air Force base.

PROBLEMS CAUSED

The Board determines that the probable cause of this accident was the use of a pressurized cabin rating in exploding dynamite as flight

in the Civilian "Boeing" aircraft.

JOHN R. DODD,
CIVIL DIVISION
CHARLES D. DOODS,
CIVILIAN AIRLINE
LAWYER, J. STEWART

SUPPLEMENTAL DATA

The Civil Aerostatic Board was advised of this accident early on the morning of July 21, 1967.

An investigation was immediately conducted on numerous sites in the proximity of Western Air Lines and the Civil Aerostatic Board. No evidence of any criminal wrongdoing, including all possible criminal acts, inspection procedures, and criminal wrongdoing and rejects.

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Flight Personnel

Capt. William E. Stark, age 37, had been employed by Western Air Lines since March 25, 1946. He holds a valid commercial certificate with airline transport and multi-engine land ratings and an appropriate instrument rating. His total flying time is listed as 1,947 hours, with 1,692 hr. in the type aircraft involved in this accident.

First Officer Sch. M. Oberg, age 25, had been employed by Western Air Lines since September 1944.

The two fatal aircraft collision with commercial rating. He had a total of 1,215 flying hr., with a total of 15 hr. in the Convair 240.

Secondader James M. Billingsley, age 15, had been employed by Western Air Lines since June 30, 1944.

He had received the company's mandatory training and checklist on the aircraft in service.

The Aircraft

N 84619 • Convair 240 J. Had a total of 21,644 hr. of which 10,097 had been since purchased. An ex-military aircraft used by the Civil Aeronautics Administration.

The aircraft was equipped with two Pratt & Whitney R-2850 engines and two Hamilton Standard H-1000-HI propellers.

Turnaround, both engines were hot-surfaced. No. 1 1,410 ft. and No. 2 1,471 ft. with 1,199 ft. and 1,190 ft. on No. 1 and 2 propellers, respectively.

West Coast Mid-Air Crash May Bring Traffic Change

Mid-air crash at night in clear weather at about 2,300 ft. of McMurdo Transport Service DC-6 and Navy PTV patrol bomber in the emerged. Net will area near Los Angeles International Airport in flight to bring regulation area for single traffic controller for airports from which the two planes took off.

C-118 was cleared for takeoff by CAA control tower operator at Long Beach Municipal Airport.

PV-2 was cleared for departure by Navy tower of Los Alamitos Naval Air Station. Approach and departure are approximately 6 mi apart.

Planes met off within one minute of each other and crash occurred 6 min later.

Lights of planes could easily have blended into background of ground lights to make visibility confusing. One of two NAVI services of the crash who was conscious after crash was unable to say what happened.

WHO'S WHERE

(Continued from page 23)

Changes

William L. Kaus, Jr., engineering manager, Search Engine Equipment Section, Seafire Products Division, Raytheon Company, South Bend, Ind.

James R. Deek, general sales manager, Elmer's Products Division, Raytheon Company, Co. 100, Mass.

John C. Hefner, Jr., vice engineering representative, Washington, Allen Division, General Motors Corp., Indianapolis, Ind.

Wesley L. Gaskins, manager, Flexible Tubs and Cables, Research, Development and Test Group, Co. 100, Raytheon Company, Co. 100, Somerville, Mass.

Lucas De La Rosa, research and development engineer, Elmer's Products, Inc., Post Warburg, N. Y.

A. J. Lilly, director of sales, Canadian Ltd., Montreal, Canada. Also, Karl H. Lenz, director of Canadian aircraft sales.

Arthur G. Johnson, director of aircraft research and development, Louis V. Armento, director of aircraft parts sales and special projects.

Dowell C. Kirk, operations manager, Inland Testing Laboratories, division of Cook Electric Co., Chicago, Ill.

Philip Rosenthal, director, Mechanics Research Division, Research, American Machine & Foundry Co., Chicago, Ill.

Myron F. Reynolds, head-chessie group, Adelphi Reynolds Corp., Alexandria, Va.

George F. Rolland, research work manager, Kansas Aircraft Corp., Blue Springs, Okla. Also, Charles W. Robinson, production manager, Lockheed test operations; William H. Hartman, quality control manager; and Matthew J. Kelle, manufacturing engineer, Mooney operations.

Don Morris, sales manager, Memphis, Tenn. South Pacific Coal.

T. E. Blanton, assistant general sales manager, and William H. Miller, military sales representative, Raytheon Industrial Aircraft Service Inc., Worcester, Mass.

Robert J. Hause, sales manager, Kodak Aircraft Products Co., Dayton, Ohio.

Alfred J. Wertheimer, III, plant manager, The Weatherly Co., Chelmsford, Mass. Mr. Wertheimer will direct all manufacturing activities of the Special Products Division.

Andrew A. Mueller, chief of Engineering Laboratories, Chicago Area Industries, Inc., Melrose Park, Ill.

Paul E. Lounsbury, manager, Marquette Division, Raytheon Manufacturing Corp., Yale, Conn. Calif.

Gordon H. Klemm, contract to the rate president and general manager, Northrop International, division of the Northrop Aircraft Inc., Novato, Calif.

James H. Morris, general manager, NRC Engineering Corporation, division of National Research Corp., New York, N.Y.

Alce R. Crofts, instant chief engineer, nuclear fusion research, Astro, division of Magnetic Axial Co., Vis-Nav Calif.

D. J. Gibbons, declassification manager, Army Missile Systems Division, Lincoln Airplane Co., Lincoln, Neb., Calif.

Charles M. Strohfeld, vice president manufacturing, Cannon Hatch Co., Raytheon

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LETTERS

Unfair Distortion

An one who has allowed your publication through his pages, I was inspired to write a short article which appeared in your "Washington Board" (AW, Dec. 30, p. 17). The paragraph in a short article in my note was reprinted "Breviorum Precepta."

In the paragraph the Office of the Assistant Secretary of the Air Force for Materiel is quoted as having 16 persons—extending to many to poor readers that these funds added up to an enormous amount.

An one who has worked with both of these agencies, let me point out that each of them is a division under Materiel which may help you to correct this distortion, if such a story does.

The OASD (M) staff maintains there represents the total budget which establishes policies for the Army, Navy and Air Force, and not just for their own particular program, or their own administration. This staff is very efficient, hard-hitting, and tackles the most difficult of getting the military departments to coordinate their activities in these fields.

The men of the Assistant Secretary of the Air Force for Materiel, on the other hand, represent a unique perspective of the Air Force personnel engaged in research operations. Essentially, they are involved in the appraisal or diagnosis of requirements basis which are presented to them by personnel of the Air Materiel Command whom staff come into the picture of discussions.

A LONG-TIME SUBSCRIBER
Washington, D. C.

Great Sin

I am not a proponent of supersizing; however, and I do not wish it to appear that I object to the intent of supersizing as in the Dec. 16 issue of Aviation Week entitled "Vanguard's Best Secret."

Your interesting, informative, generally well engineered article discusses the vendor's intention from a potential source of the Vanguard's failure.

As one who has worked on projects that have had the posture of deadlines breathing down his neck, I would say how an sympathetic attitude to the manufacturer that Vanguard's margins were forced to suffer. This is a personal opinion which does not raise questions, which I have been asked to do, but rather a "What if?" analysis of no questions these two only a handful of people involved, the original because unavoidable at that time. Consider that the magnitude generated when the shell could be caused to burst over every millimeter of a nose even without a war, even though you might think. With this hindsight

division Week substantiates the opinion of its readers on the issues raised in the manufacturer's editorial column. Address letters to the Editor, Aviation Week, 1250 Avenue of the Americas, New York, N.Y. 10020. Please keep them brief and to the point. Acceptance under 500 words and a reasonable identification. We will and pursue noncommercial delivery, but names of writers will be withheld on request.

postponed psychological pressure—it is a pressure we all feel.

It is also true that he has commented in whatever mode it constitutes that incomplete detailed problems of the Vanguard I involving the potential. Not necessarily the effort which made the particular decision but rather the situation cause it for reasons known to him to have the "power" of the situation. In this case, the hybridized closed class. What it all means for the whole generation of new ideas either an freedom to serve the interests of our country.

In communication of that world is sound and clear. I would like to emphasize that he has established for these Vanguard engineers who were forced to deal level sacrifice them often for the "freedom of the press."

C. F. FRANCKA

An engineer with an association with the Vanguard as one of its primary members.
Sanford, N. H.

Inaccurate Material

As a long-time reader of your magazine, I have developed the highest possible regard for your editorial staff. However, I must point out the facts which I believe are inaccurate in the approach as diagnosed of requirements basis which are presented to them by personnel of the Air Materiel Command whom staff come into the picture of discussions.

I take no pleasure in criticizing. However, I feel compelled to have written the following comments despite my knowledge of your reputation as a most accurate magazine. I believe your article in which is in my knowledge inaccurate in some respects. Likewise your staff did a good job in presenting the article. I feel it could have been improved to make it more complete, comprehensive and perhaps more fully to all concerned.

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When we filled the entirety of p. 118, at an inordinate expense, with an advertisement of one integrated system, and he could have contained it to have obtained a complete description of all the equipment that he offers.

In addition to the fact that our company has supplied a large number of that type of equipment and systems only moderate interest in the article. I note that Convair Electric received over 100 letters and I can assure you that the company is in the business of high voltage. I can also have added significant technical information to a ground while an ammonia heating simulation.

At any event, this article has presented material in a situation that is extremely teach and will undoubtedly be getting greater interest. I hope to continue to do this in the future to open more and practical problems due to environmental testing before corresponding more complete.

E. G. SCHAFFNER
President
Research Inc.
Hayden, Mass.

Cold Facts

Having read Mr. Jason Sandis' letter in the Dec. 30 issue of Aviation Week (p. 96), and the many comments made in open letters in view of issue of Jan. 27 (p. 222), there is one which may dispel and facilitate explanation of the cold test in an addition to being entitled "These Cold Facts," by Charles P. McNamee of Baldwin Hills, N. J.

My review in Mr. McNamee's letter is in "AVIATION" I consider it even more important.

H. H. ROBERTSON

Baldwin Aviation

Los Angeles, Calif.

Standing Up

I am standing up and hopefully wish to be counted! STEVEN J. VITALEVICH
Los Angeles, Calif.

Lights On

With reference to the CAFE accident reported published in the Jan. 4 Aviation Week (p. 96), my recommendation for refueling the Midfield of urban centers is to invert to operate position lights at an inverted rate of eight feet per second.

A trip to the cockpit during daylight suggests weather conditions unless the road leads have four lights all still illuminate to ensure that position lights above make an inverted view to the pilot. A practical limit of the red reflectors are the aggregate.

As always, the aircraft must be a proper configuration, so a rural state, in which all aircraft should somehow in keep looking normal while they are in the pattern of having a turn over. On a few occasions I have diverted my attention from a left turn just to have to wait for a safe altitude shot.

STEVEN J. VITALEVICH

AVIATION WEEK, February 17, 1958

ATLAS missile

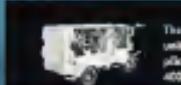
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